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## The Rôle of Pastures in the Development of the Strongyloid Diseases of Grazing Animals*

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The strongyloid diseases of grazing animals are among the worst with which the grazier has to contend. World-wide in their distribution, they cause great loss through acute disease and death and probably an even greater loss through the bad thriving and the indefinite and chronic disease which results from a less numerous infestation of the parasitic worms.

So widespread are the parasites, and so likely are the diseases to appear, that their occasional visitation is regarded by the farmer as one of the normal happenings incidental to stock raising.

It is an interesting fact that the underlying reason for many of the every-day practices of the grass-land farmer is the control of these parasites although that reason is, of course, quite unknown to him.

Foremost among these practices perhaps is the requirement for the frequent movement of stock from one pasture to another: this is universally observed and appears to be one of the basic principles of good grazing. The keeping of calves off the pastures until the dew is off the grass is another common practice unconsciously designed to control parasitic worms. Again, the method used for the folding of sheep in a small pen over crops on arable ground and the movement of all young sheep towards the end of the summer from heavily populated areas of rich pasture, such as that on the Romney Marsh on to pastures that have been free from sheep: all have their origin in the control of diseases caused by parasitic worms. In every instance the results are brought about through limiting the multiplication of strongyloid nematodes and making compensation for the state of ecological unbalance between the parasite and its host which has been brought about by man's improvement of grazing land and the herding together of animals on small areas of rich pasture.

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Parasitic gastritis in ruminants, husk, and parasitic enteritis of horses are the three most important diseases caused by strongyloid worms, some 50 or 60 different species of worms being concerned. The life histories of all of these parasites are so similar that for practical purposes they may be regarded as identical, the essential points being covered in the following brief account. The parasitic adult worms lay large numbers of eggs which pass out of the host animal and go through some stages of free-life development on the ground, finally reaching a stage at which they are ready to infect another animal. When taken in with the herbage by a suitable host they develop into parasitic adults and produce large numbers of eggs. The point that they produce large numbers of eggs is an important one, and as an example of the energetic way in which some worms do this, the pig ascaris, which has been estimated to lay some 200,000 eggs daily, may be instanced.

It is obvious from this history that there is just as definite an association between the parasite and the pasture as there is between the parasite and the host, and the close connection between the pasture and the disease is perfectly clear.

There is also one other important point which may bear repeating once again before proceeding to the main consideration of this paper. Whereas in the case of bacterial, virus, and most protozoal diseases, the introduction of infection is often followed by the development of disease, and in many instances an epidemic would be the normal result, such is not the case with the strongyloid nematodes, as the parasites which cause these diseases are almost invariably present wherever sheep, cattle or horses are kept; so long as the parasites remain few, however, disease does not result. It is necessary for animals to carry parasites numbering tens of thousands or hundreds of thousands before symptoms of actual disease are shown. The conditions required for the increase of the parasites are largely concerned

with the management of the pastures and of the grazing animals on the pastures, and it is the factors concerned in this that we are to discuss.

From the point of view of understanding the development of these diseases we have now covered three important items. First, there is no multiplication of the parasites in the body of the host animal; second, very large numbers of eggs are produced during the parasitic stage; and third, the parasitic worms are almost ubiquitous in their distribution.

In view of the wide distribution and the tremendous egg production one may well ask how it comes about that grazing animals ever escape the disease?

Of the several factors which decide whether disease will develop or not in any given flock or herd the level of immunity in the group is very important. A considerable amount of work has recently been carried out on this subject, and although it does not come within the scope of the title of the paper it should be mentioned, in passing, that a relatively strong resistance develops in the host about the time that it reaches maturity, after which most of the infective larvae that are picked up are unable to develop. The resistance is not absolute, however, and may break down if the animal is under-nourished or on a diet which is deficient in some constituent, or as a result of an excessively high rate of intake of the infective larvae of the parasites.

This immunity of adult animals is nevertheless responsible for giving the ecological unit of host, parasite and environment a certain elasticity. Without a very considerable resistance of this kind it would be quite impossible to maintain animals in a state of health in anything like the crowded conditions that prevail everywhere on reasonably good pasture at the present time.

In considering the importance of the environment, however, it may be interesting to note here the disappearance of man's helminth parasites from civilised countries where only a few species have managed to resist extermination. This clean sweep has not resulted from the use of drugs, however efficient some of them may be, but is a natural result of the institution of modern sanitation which almost completely prevents the contamination of food with faecal material.

Grazing animals appear to be in a particularly unfortunate position in that they may be said continually to soil their plates, a circumstance which seems to be essential to their mode of life. Our hope lies in the strength of the immunity of older animals, and so long as they are maintained in a state of health, they are able to withstand a moderately high rate of intake of infective larvae. If the farmer observes care, and does all that he is able to do in limiting the rate of intake of larvae, while maintaining the animals in a state of good nutrition, it is possible to practise the crowding of animals on to rich pasture that modern agriculture requires without helminthic diseases appearing.

In order to be able to do this in a rational way, and to the best advantage, it is necessary to know as much as we can about the influence of various factors at work in the pastures upon the development of larvae, their longevity, their rate of disappearance and the rate of their intake by the grazing animal.

These factors have received special consideration in the work on parasitic gastritis recently carried out at Weybridge and might be discussed here under the headings of *those affecting development of larvae, those affecting longevity and rate of disappearance, and those affecting rate of acquisition by the grazing animal.*

The idea of parasitic-worm infestation is very closely linked in the mind of the average stock owner with wet pastures. There is little doubt that this idea originates in the association between liver rot, one of the most spectacular of worm diseases, and wet land which is essential in that instance has been extended by the farmer to other worm diseases.

Field observations suggest that although there is an undoubted difference between the arid pastures of some foreign countries during the dryest part of the year, and the green pastures of our own climate, there seems to be no reason for supposing that any significant difference exists between what would be called a dry pasture in this country and a wet one, and our "dry" pastures are by no means to be regarded as safe from worm troubles.

One of the effects of cold is to slow down the rate of development of the infective larvae; this development is completely inhibited by severe cold and during such periods the daily addition to the store of available infection in a field, always in progress while stock are grazing there, receives a sudden check. As will be shown later, however, cold also has another action, one that influences the rate of *acquisition* by the grazing animal.

Arable ground is always a danger, particularly where sheep are penned closely together, as under these conditions the faeces are trampled into the soil, forming a perfect culture medium which is very much more suited to the growth of the larvae than is the surface of hard ground.

It is probable that long grass also has a favourable effect over the development of the larvae, through keeping the faeces moist and preventing the formation of a hard "skin" on the outer surface, so permitting better aeration.

A knowledge of the longevity of infection in pastures, and of the rate of its disappearance, is, obviously, of first importance in making recommendations for control, and the two questions which a parasitological adviser is most frequently asked refer to the duration of infection in a field and as to how to kill the larvae there.

The inconveniently great longevity of the larvae has been known for a considerable time; fields have been observed to retain infection for more than twelve months, but until quite recently no observations had been made on the *rate* of the disappearance of larvae, which is quite an important practical point.

Observations made on freshly infected pasture at Weybridge showed that the infective larvae disappear rapidly during the first few weeks and that it is only a very small proportion of the originally large number of larvae that are able to retain their vitality for anything like twelve months.

Of all natural factors acting upon the resting stages of these parasites in the field, dryness seems to be the most lethal; the infective larvae are quickly killed by exposure to conditions approaching absolute dryness, and further investigation into the reason for this rapid disappearance of the majority of infective larvae has shown that those which climb high on to the grass have only a short life, some of the most exposed dying within 24 hours of reaching the tip of the blade of grass. The long-lived larvae are those which, because of mechanical obstruction to their upward migration, are kept near to the surface of the soil, where even in the dryest weather, there is a moist microclimate, favourable to their prolonged existence.

As to killing the larvae by the application of heavy dressings of quick lime, salt, or kainit, it must be admitted that that line of attack does not hold out much hope. Tests made at St. Albans and at Weybridge have shown that there is some justification in the claims of the agents for calcium cyanamide that it has larvicidal properties over and above lime, copper sulphate, salt, kainit or other substances that are occasionally applied broadcast over pasture land, but in order to produce any appreciable effect it would require to be applied in such large amounts that the green herbage would be almost completely destroyed.

Undoubtedly the best way to bring about a speedy diminution of the larvae in an infected field is to have it grazed by some kind of stock that either cannot be infected with the species of parasite concerned or is relatively resistant to infection. The principle of practising mixed grazing as preferable to grazing with one kind of stock is well established but its full advantage is only just being realised. Work which has been carried out at Weybridge along the new line of recovering larvae from the pastures and estimating the number present per pound of herbage has shown the number to be much higher than had previously been supposed; for example, a certain small paddock attached to a public stud was found to be carrying some six thousand infective red-worm larvae per pound of herbage and the efficacy of grazing with unsuitable host animals will be better realised when it is pointed out that each member of a flock of sheep placed in that paddock would collect and destroy some 60,000 or 90,000 infective red-worm larvae. Strongyloid larvae taken in by an unsuitable host attempt to develop but are unable to do so, and die.

The same thing happens where resistant adult animals are grazing on infected pasture, and where ewes and lambs are grazing together the ewes, although they are responsible for the infection of the pasture in the first place, do a great deal to limit the amount available to lambs by eating it off and destroying it. Lambs grazing alone without older sheep are in a more dangerous position on that account.

There are one or two interesting points concerning the rôle of pastures in influencing the rate of intake of infective larvae by grazing animals. Work on the recovery of larvae from pasture herbage has helped us to appreciate one point which had not previously been thought of, namely, the influence of the amount of herbage on the rate of intake. Herbage may here be regarded as diluent to the larvae; where there is a large amount of grass the number of larvae per pound is correspondingly low, but where grass is very scarce, as where there is overcrowding, or during times of drought, the number of larvae per pound will be high. A grazing animal under these conditions would have to collect its day's requirements from a large area of the field, and although the number of larvae per square yard may be approximately the same as on an area well covered with herbage, the number per pound of short herbage is much higher and disease is more likely to result.

There is an interesting story about the effect of drought on the rate of intake of infection. During dry, hot weather the faeces lying on top of the ground quickly become dry, when larval development ceases. It was shown by Mönnig, however, that when the egg of a certain important pathogenic worm of the stomach, *Trichostrongylus axei*, has reached an advanced stage of development, and the embryo is just ready to hatch, it is very resistant to dryness. An accumulation of potentially infective material therefore occurs during a time of drought as the faeces retain moisture long

enough for many of the eggs to reach the stage in which they are resistant to dryness; dry conditions then check their further development but they remain alive until moist weather conditions recur, when they hatch. The larvae then proceed to grow to the infective stage and a mass development of third-stage infective larvae takes place.

The sudden appearance of wet weather after a long period of drought is therefore a critical time for the sheep farmer, who should remember that his pastures are then probably carrying a particularly large number of infective larvae.

There is little doubt that cold has a similar action, for, while it arrests development it does not destroy the eggs or larvae. During cold periods, therefore, an accumulation of eggs occurs whenever infected animals are grazing, ready to develop *en masse* to the infective larval stage as soon as warm conditions recur.

There is also a very interesting story concerning the effect of different kinds of herbage upon the rate of intake of strongyloid larvae. It has been observed at Weybridge that a large number of the infective larvae of these worms in endeavouring to ascend the growing shoots of grass are obstructed by the divergent blades, and by the sharp-edged collar that clasps the stem at the junction of leaf and sheath in many species of grass. They are therefore turned off along the under side of the lower leaves. There is no obstacle of this nature to their upward progress in clover, however, and there most of the larvae are found on the trifoliate part at the top of the petiole.

Sheep, we are told by the workers at Aberystwyth, are extraordinarily selective in their grazing habits, and are very skilful in chosing the most succulent parts of the herbage and leaving the older and tougher parts behind. While in grass, therefore, they tend to leave much of the infection on the tough underleaves, but in clover tend to pick up a much greater proportion of the infective larvae. This observation fits in perfectly with the history of the campaign that has been carried on in Northumberland for the improvement of pastures by the application of basic slag. Although the pastures have been greatly improved the incidence of parasitic gastritis in sheep has increased far beyond what it was before the pasture improvement began. A principal effect of the application of basic slag is a great increase of wild white clover and it is probable that the increased incidence of parasitic gastritis has been brought about in the way just suggested.

Another observation made at Weybridge showed that large-topped herbaceous plants which make comparatively little contact with the ground carry less larvae than grasses or small clovers growing side by side in the same field. The inner leaves of plants that produce their leaves in whorls are also comparatively free from infective larvae.

This brief survey has avoided, as far as possible, all mention of factors other than those concerning the pastures themselves governing an increase of infection in the grazing animals, and it is obvious that these play a very important rôle in the development of disease. From the observations which have been mentioned we can learn that alternate grazing with unsuitable host animals is more effective than had previously been supposed; that adult animals, although they are responsible for the infection of pastures, probably also serve a useful purpose in eating off and destroying many infective larvae; that a period of drought is dangerous in greatly increasing the rate of intake that a rapid or plentiful growth of herbage acts as a diluent to the dose of larvae; and that a wet period following a prolonged drought is particularly dangerous. We have already seen that the relatively strong power of resistance of older animals gives the parasite—host—pasture environment a considerable elasticity that allows of the crowding of animals far beyond what would otherwise be possible. There is still a great deal to be learned about the influence of pastures upon the development of these diseases, and the danger of loss from helminthic disease is likely to dog the progress of pasture improvement until we know much more about this important subject. The outlook is not hopeless, however, and providing we keep adding to our store of information we may be able to improve the present hazardous conditions of the grazing of young animals and continue with pastureland improvement and increased crowding of stock without disastrous results.

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## Discussion

**Dr. R. F. Montgomerie** said that he thought he should explain that it was only after the meeting commenced that he was asked to open the discussion. At first he had refused but then realised that he should be delighted to have the opportunity to open a discussion on a paper by Mr. E. L. Taylor, because every one of them greatly appreciated the help they had had from Mr. Taylor as individuals. Furthermore, through his research and from his pen had come some most valuable contributions towards the understanding of parasitic disease which had been most profitable to them all. (Hear, hear.)

One often thought of Mr. Taylor as a parasitologist who went wrong. (Laughter.) Formerly, the parasitologist was very largely a man who described the structure of worms and "invented" wonderful names which none of them could keep in their minds. He had known Mr. Taylor

for many years. He well remembered that when he found that Mr. Taylor was rapidly developing as a parasitologist, he had thought to himself, "What an awful waste of a good fellow." (Laughter.) But that was very wrong, because Mr. Taylor had utilised his knowledge of, and labours in the science of helminthology, for the benefit of his fellow members of the veterinary profession in a special way. (Applause.)

That was very well illustrated in the address Mr. Taylor had just given, because when they asked him to open the discussion he feared that he had forgotten the helminthological names, and yet Mr. Taylor used the technical name of only one worm during the whole of his address —that being so, there was very sound reason for congratulating him upon the manner in which he had "got across" the very good material he had given them. Mr. Taylor had established an eminent position as a "clinical helminthologist."

They would all realise that—if he might be permitted the pun—it was only through a fluke that he became interested in parasitology at all. (Laughter.) One special point that he hoped Mr. Taylor would carry a little further in his reply was this question of immunity. He had said that although the adult might take in a very large number of larvae, only 1 per cent. become mature and egg-laying parasites. He was not sure whether Mr. Taylor wished to convey to their minds that this "immunity" was of the type which one thought of in the field of bacteriology. It was, of course, perfectly proper to emphasise that in parasitology they could not adopt the idea of "infection" current in bacteriology because the parasites did not multiply in the body—it was a perfectly legitimate starting point; but when it came round to "immunity" and "resistance" perhaps Mr. Taylor did expect them to accept the terms in the bacteriological sense. He was afraid, for his part, that he had not been able quite to accept parasitological immunity in that sense although he appreciated that "immunological reactions" had been demonstrated in some cases. He would rather suggest that the conditions in the intestinal tract of the adult animal were very much less suitable for the development of the larvae than were the conditions in the young animal.

He was still, he was afraid, sufficiently old-fashioned to have had, until that night, the idea that there was something wrong from the parasitological point of view in grazing the adult animal with the young, yet Mr. Taylor had said that the adult animal was actually a means of cleansing the pasture. He feared that there might be a fallacy in the argument that the essayist had put forward. He (Mr. Taylor) would admit that the adult animal was infested with these parasites, and he (Dr. Montgomerie) would submit, for his part, that some of these adult animals were passing a sufficiently large number of eggs for them to be considered a danger. An occasional adult, at least in some infestations, might be passing eggs in much greater number than one would expect from the size of the actual infestation. He would suggest that those adult animals were a danger to the young animals that might be running with them. Moreover it was a very special type of pasture contamination. These eggs from infested adults were going to develop to infective-stage larvae which would be picked up by the young stock before they had time to die off.

As had been pointed out by Mr. Taylor, there were other factors at work cleansing pastures, particularly that factor of time, and yet he brought in that adult animal as a cleanser of pastures, when he (the speaker) suggested that these adults were acting directly against the time factor.

He was afraid, therefore, he was not convinced that the old ideas were wrong. He would still, he feared, sound a warning as to the grazing of adult with young stock.

He was rather struck with the fact that Mr. Taylor did not put a great deal of emphasis on the anthelmintic treatment of the pregnant animal as a means of preventing pasture contamination.

Mr. J. G. W. Leiper said that he would like to add his tribute to Mr. Taylor's work and the tremendous amount he had been doing at Weybridge on that important subject—and, as had been said before, essentially practical work. It was work which had been neglected to a large extent.

As he saw it, purely from a pastural point of view, the measures for control of the parasites on the pastures gave several ways of attacking them. As Mr. Taylor had pointed out very clearly, although these worms could live for a matter of years, it was only a small percentage of infective larvae which survived. That was a very important point; if the pasture was rested for, say, a month, that might render it safe. It was a matter of degree: infection was always there, but it was only when the worms were present in very large numbers that a pathological condition could be set up in the grazed animals.

With regard to the generally accepted idea of the upward migration of larvae under favourable conditions (dull light and high humidity) and the successful downward migration immediately conditions became unfavourable (strong light, lowered humidity), he asked Mr. Taylor whether he was in agreement with this downward migration in view of his work, showing that a high percentage of larvae were found dead on the top one-inch of grass blade; did not this suggest that larvae were stranded and subjected to adverse conditions?

He wanted to know if Mr. Taylor had considered the varying conditions found throughout the year. Certain conditions were required before the larvae would migrate and he thought that the time of the year and the time of day might influence migration to a large extent. In the winter they might remain at the bottom of the grass, and in the spring they might migrate

up. Personally he thought that the *Trichostrongyles* infected animals more in the autumn: it might be that the conditions were better then for the migration of larvae and although parasitic gastritis was encountered at various times of the year it appeared to him that infection was picked up more in the autumn. He was wondering if Mr. Taylor had any similar findings in that respect.

Then, feeding was so much poorer in the autumn months; artificial feeding had not started and the grasses were poor. Had Mr. Taylor found that those gastro-intestinal worms produced a chronic disease, *i.e.*, that it was four or five months before the effect was noticed.

It was very interesting that Mr. Taylor could examine the grass and find out the amount of infection present: he had hoped that Mr. Taylor would disclose his technique for that. "When one can take a sample of grass from pastures and get accurate analyses from the point of view of infectivity, that will be a tremendous advance," said Mr. Leiper. The little work he himself had done now appeared unsatisfactory from the point of view of recovering larvae from heavily infected pastures. It was disheartening to pull up a pound of grass—a somewhat laborious process—and find only 50 larvae on it; what was more, the results of sampling were very conflicting.

He would ask, in conclusion, how long Mr. Taylor considered it necessary to keep a pasture free from stock to render it helminthologically safe to graze again. He thought that Mr. Taylor had brought to them the whole idea of pasture hygiene very effectively and he was sure they all felt that they were now beginning to get the knowledge they required.

Dr. J. N. Oldham observed that he had listened with a great deal of interest to what Mr. Taylor had said and he would like heartily to support Dr. Montgomerie's tribute to the excellence of the work Mr. Taylor had done. At the commencement of his address Mr. Taylor had mentioned that the various grazing practices all had some degree of history behind them, but he felt at the time that Mr. Taylor did not emphasise quite sufficiently the essential difference between what one might call progressional grazing and rotational grazing. The difference was that the animal under the rotational system did have a chance of going back again after a few weeks to the same pasture, whereas under the progressional system, it did not. He had done some work under Dr. Leiper at St. Albans, for a period of about four years, and then Mr. Leiper took it over from him. They were interested in the New System of Grassland Management in which a number of animals were grazed over a small area; at the end of a week they were moved on to an adjoining similar-sized area, and so on, with a six or seven weeks' rotation. It occurred to them that here there might be an excellent opportunity to observe the piling up of the parasitic burden of animals and they set out to see what they could find about it. Naturally the animals did pile up a very heavy infestation towards the end of the experiment and practically all of them died as the result of trichostrongyle infestation. While these experiments were running, during two of the years they had had very dry weather, and the results were extremely interesting and illuminating: they bore out exactly what Mr. Taylor had said. During these dry summers the herbage was extremely short and one might have thought that the animals were going to pick up fewer larvae; actually they took up tremendous numbers, simply because they had to graze very close to the ground and over a long period each day in order to get sufficient food.

They found, over the three or four years' period of work that, to mention a scientific name (laughter), *Haemonchus contortus* produced heavy infestation earlier than the other trichostrongyles. It was possible that, since *Haemonchus contortus* was pathogenic and the resistance of the animals had been lowered by insufficiency of good food, they were not able to overcome the effects of *Haemonchus* infestation and this form established itself in the animals. Some weeks later, in the early autumn, they found that the other trichostrongyles became exceedingly numerous in the animals, probably due to the fact of the lowered resistance from the heavy *Haemonchus* infection. The animals that had died were all subjected to *post-mortem* examination and by means of simple methods they were able to compute the number of worms present: 26,000 was one figure he carried in his mind, which they got from one animal alone.

There was also brought rather forcibly to his notice the effect of a break in the drought and in one particular experiment they found that when the drought broke there was a marked liberation of larvae and the infection went up very considerably: they knew it went up because throughout the experimental period every animal was weighed at fortnightly intervals and at the same time a faecal sample was taken from the rectum and an egg count was made. Very frequently one could predict, almost to within a week, the death of an animal simply by noting the sudden increase in the number of eggs in the egg counts.

Professor G. H. Wooldridge commented that he had been extremely interested in the address which Mr. Taylor had given them and the very practical bent it had taken. He thought he might refer first to the point that was raised by Dr. Oldham in respect of the occurrence of heavy infestation in a time of drought. In their observations in the field many years ago, before much was known of the actual life history of those parasites, they realised that soon after a drought had broken they were likely to get the indications of acute parasitic gastritis in the lambs. They rarely got any symptoms during the drought, and though they had been wont to say that there might have been heavy infestation during the drought—largely because of the sheep having to graze close to the ground—it would seem that the change in the weather was a very important factor in respect of the onset of the disease.

In regard to grazing, Dr. Montgomerie had expressed disagreement with Mr. Taylor's suggestion that it might be a wise plan to let the adult animals graze with the young animals because that might tend to clear up some of the infection. He (Professor Wooldridge) agreed with Dr. Montgomerie: he should hesitate to accept the suggestion because he could not advise that the young animals should be allowed to graze with the adult stock, although the danger was offset by the considerable degree of infection of the pasture that these adults would have removed by grazing.

In respect of the rotation of pastures, that had been referred to by Dr. Oldham, but the rotation of pastures in small divisions was a very different thing. Its principle was that the periods of rotation should be very much extended. He knew that for some sheep farmers it was not possible to practise a wide rotation,

which, roughly speaking, consisted in dividing pastures into three sections: that one area should be left free from ruminants for one complete season; that another area should become the pasturage for the young stock for the succeeding season, and that the pasturage that had been used for the young stock for that season should become the pasturage for the adult stock for the following season. The land used by adult stock now became the vacant pasture; it might be used for hay production during the first half of the year, and during the other half grazed by animals of a different species. Such a system, he thought, would go far to reduce the incidence of parasitic infestation. It was of interest to note that even a comparatively short period of freedom from animals would materially cut down the infection: he himself had not realised that much benefit could follow such a short period of freedom.

In regard to ploughing, he thought the real point which was at the back of the minds of those who recommended ploughing had been missed—it was that a longer period would be left until the animals would again pasture on those grounds. It was this period of freedom rather than any mechanical destruction of the parasite, killing off the parasite by the mere turning up of the land, that was of importance.

Mr. Taylor had said nothing about hay, but he thought it was of considerable importance where a pasture had been converted into hay, such pasture having been infested with parasites from one species of animal, that such hay should be very definitely saved for animals of another species. It would be very interesting to get Mr. Taylor's opinion about that: was there a possibility of hay conveying the infection under these conditions? He felt that even although it might not be a very important means of conveying it, that hay nevertheless did convey infection. He had known studs of horses in London that had not been on pastures for years that had, in certain years, been infested heavily with so-called red worm. Their only sources of infection had been imported forage, and water, and one would naturally assume that it was by means of the hay that had been brought in from so-called horse-sick pastures that these animals derived the infestation.

He would like to have a little more information about the so-called immunity and resistance. Like Dr. Montgomerie, his mind immediately harked back to the type of immunity secured through bacterial infection. He was not so ready to cast aside that immunity, however, because he felt that even yet it might be found that some toxins were produced and eliminated by those parasites and absorbed, and there was a possibility that there might be some antitoxic effect resulting from an early toxic infection. He put that forward simply as an hypothesis, without any evidence to support it.

He thanked Mr. Taylor for his paper.

Dr. W. R. Wooldridge said that it was always a pleasure to listen to an address assailing, in the light of knowledge gained from careful experiment, views that had been re-put into text-books in spite of the fact that they were based upon no reasonable evidence. Mr. Taylor put forward many principles which were quite new to him (the speaker) and which would, no doubt, be hotly contested by those holding the older views; from the discussion and further work advance would come.

Mr. Taylor had mentioned certain factors which influenced the number of worms to be found on pastures, but he did not express any view as to whether the worm on the grass needed food material other than that originally present in its own egg, for its complete development to the stage when it is taken up by the animal. If additional food material was required, perhaps from succulent grass, methods might be developed to attack the worm from this angle.

Mr. Taylor had remarked that the susceptibility to worms of young animals was greater than that of the adults and that the presence of adults with young beasts was an advantage rather than a thing to be avoided. As both were grazing on the same pasture the actual number of worms ingested by the adults would be greater than with the young animals as they eat more food. One would expect from this a large excretion of eggs, particularly in view of the huge number of eggs produced by the female worm. If Mr. Taylor's view was correct the vast majority of the ingested larvae must be rapidly destroyed in the alimentary tract of the adult animal, and as one worm produced thousands of eggs, many of these must also be destroyed. Unless this was so the actual number of worms individually returned by the adult to grass must exceed the number ingested and hence the adult must be a danger to the younger beasts. Had Mr. Taylor got experimental results to show that this was so?

Mr. A. N. Worden observed that during the last twelve or 15 years there had been a great increase in the amount of research carried out on grassland improvement, and that many of the findings of that research were now being put into practice. Mr. Taylor had mentioned at least two of the measures in question, one being the use of basic slag. He had told them that its employment on certain pastures in Northumberland had exerted a very beneficial effect upon the wild white clover content of the herbage, but that at the same time the animals grazing on the pastures had become very much more heavily parasitised than formerly. Mr. Taylor had also mentioned ploughing, which had been dealt with by other speakers.

There were, however, certain other factors which formed part of the grassland improvement policy and which seemed to have a direct bearing upon strongyloid infection. Firstly, there was the type of grass which the farmer was being encouraged to grow—short-stemmed and predominantly leafy strains. Secondly, there was the practice of intensive grazing which the stock-owner was being encouraged to adopt. Linked up with this was the time factor, *i.e.*, the length of time for which the pastures should be left from the point of view of their own quality and composition. Thirdly, there was the modern tendency to discourage permanent pastures and to replace them by one-, two- and three-year leys. He wondered if Mr. Taylor would care to give his views as to the impact of these measures upon parasitic infestation.

Captain T. L. Wright stated that he had been particularly interested in red worm in horses for many years and he was especially happy to have that opportunity of thanking Mr. Taylor for the very valuable information he had given them that evening. He could only wish that he had known some of it ten or 15 years ago, when he might have got some kudos out of dealing with the condition instead of having to tell people that he did not know.

One thing that had struck him in the discussion was the question as to the wisdom or folly of turning out the young animals with the old stock. It was agreed that the older animals

had a great degree of resistance and that probably only 0·01 per cent. of the effective larvae picked up developed to maturity. Was there not a possibility that those which survived and came to maturity were developing a much more virulent strain by their survival, and that, owing to the increased vigour of the latter, enabling them to produce a larger number of eggs and larvae, the danger to the young stock was enhanced thereby?

Had the attempt been made experimentally to put weaned foals from non-infested dams on pastures which had not been grazed by horses for many years, to see whether they got infection?

Another point in regard to immunity and resistance was this: He had always had a lot to do with imported Argentine horses, and it had struck him for years that their Argentine horses seemed to be particularly prone to infestation with parasites—far more so than English horses on the same pasture: they were not very young—five, six or seven years old—and apparently healthy on arrival here. He did not know if they got red worms over there, but they appeared to pick them up very readily when put out to grass for their first spring or winter here.

Mr. E. G. Langford said that there was one point that struck him with regard to the use of basic slag on pastures Dr. Montgomerie had said that in Northumberland there had been infestation since they had introduced its use there, and that this was due to the ability of the parasite to creep up the wild white clover rather than up ordinary grass. Did he not think that the increase in parasitic infestation was rather due to the fact that those pastures carried a much bigger head of stock per acre than they did before?

Lieut.-Colonel Greenfield said that he only rose to speak on one point—as to how very true it was that grazing of infected land by other animals had a marked effect on reduction of parasites. How often we had all seen cases in which Remount Depôts or ground used by people breeding polo ponies—and used by no other animals—got so infested with parasites as to be a danger, and sometimes had to be given up for horses.

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### The Reply

Mr. Taylor observed that he must say that he was very glad that such a good discussion had been forthcoming and must thank them for giving him so many points to which to reply. He was sure, however, that at that late hour they would like him to do so as briefly as possible.

In the first place, he thought Dr. Montgomerie could always be relied on, at very short notice, to say something provocative (laughter), and he had done so very well that time in bringing up the question of immunity. He would like to mention, before he said anything else, that he only brought in the question of immunity at all in order to make the chief part of his paper more understandable. Dr. Montgomerie had taken him to task for his failure to deal more fully with the anthelmintic treatment of disease, but they must not forget that the title of the paper was "The Rôle of Pastures in the Development of Strongyloid Diseases in Grazing Animals," and he purposely avoided anthelmintic treatment and any detailed reference to immunity or even to the way in which larvae could hang on in hay, and suchlike aspects of the question before them: one had to limit things.

His view, and he thought the view of all parasitologists at the present time, on the question of immunity was that the immunity of animals towards parasitic infestation was effected by exactly the same means as immunity to bacteria. Intensive research into that side of the work only began ten or twelve years ago and there had been a tremendous amount done since then. It had been shown more and more clearly that the way in which immunity to such infestation developed was precisely the same as the way in which immunity developed towards bacteria and filterable viruses. In some cases it had been possible to demonstrate antibodies in the blood serum, but in others the resistance appeared to depend upon some change in the tissues themselves.

At one time helminthologists thought that immunity to helminths was not acquired as the result of infection and that it developed simply because the animal had reached maturity; they spoke a lot about "age immunity," but it had become more and more evident that the immunity had developed not through the animal having reached the immune age but as a result of early infection with the parasites, which, as has already been described, are present almost wherever stock are kept.

Perhaps there was no need for him to say anything about anthelmintic treatment: of course, all would readily agree that the use of anthelmintics as a curative as well as a preventive was one of the principal weapons they had for the control of those diseases. He quite agreed with what Dr. Montgomerie said, that anthelmintic treatment was of very great value and that one of its uses was the treatment not only of the infected animals but of all the animals in the group; also that when one had young animals with adults or when one had adult animals which were about to bring forth young they should be treated with anthelmintics in order to lessen their output of infected larvae on to the ground. Of course, he (the speaker), knew when he said that it might not be so good a principle as they had been told, to segregate adult animals from young, that that assertion would "start something," and he said it not with the idea of putting it forward as a guiding principle, but to show that there were two sides to the question and to stimulate a discussion: he had expected that Dr. Montgomerie would rise to the bait. (Laughter.) He thought that here perhaps he might reply both to what Dr. Montgomerie said and also to Professor Wooldridge on that point. He quite agreed that, on the one hand, infected adult animals would be infecting the pasture. Therefore it was quite obvious that if one placed infected adults on to clean pasture with new-born young one would infect the pasture. But one had no option: clean pasture did not exist, and whatever one did the young animals were certain to become infected as they were bound to graze the ground that the dam had contaminated. Thus before long, on account of their low resistance to parasitic worms, they would be excreting more eggs per gramme of faeces than the dams with which they were grazing. The grazing of the dams would now act as a check upon the accumulation of infection on the ground, as with every mouthful of grass they took up they would destroy the infection, whereas every mouthful of infected grass taken up by the young would ultimately lead to the dissemination of infection. He thought if they made the comparison which he had suggested in his paper of

ten young animals (weaned) on one area of ground and five young and five adults on a similar area of similar ground that the ten young ones were in the greatest danger. That being so, one must conclude that the adults were doing more good than harm.

Mr. Leiper made one or two interesting remarks about the migration of the larvae up and down the herbage He (Mr. Taylor) had mentioned the findings of Veglia, who reached his conclusions as the result of observations made in culture jars. He (the speaker) tried to make the same observations on the grass but the process did not seem to work. When the larvae got up into the grass they stayed there and he did not think that downward migration occurred to any extent in the pasture.

The second point raised by Mr. Leiper was the suitability of autumn for the development of the species of *Trichostrongylus*. He thought from what Mr. Leiper had said that he would agree that the autumnal multiplication of these species did not concern any change in the worms themselves, but that it was due to the comparative poorness of the herbage at that time of the year—the shortness of the grass—and also that it was at that season, before the lambs developed immunity, that the herbage contained the largest amount of infection. If the conditions had been good for the development of the larvae the parasites became very numerous and the lambs developed disease. With reference to the development of chronic disease in sheep, also mentioned by Mr. Leiper, he should think that in all probability that did exist. It was very difficult to produce chronic disease experimentally, however, and one could only make deductions from what one encountered in the field. One certainly came across flocks of sheep which did not show definite symptoms of disease but which were not doing well, and were carrying a fairly heavy infestation: he should think those were cases of chronic parasitic gastritis.

With regard to the question of technique, he hoped very shortly to publish observations concerning this. In connection with such practical details as to how long to leave the pasture in order to reap the real benefit, they still had comparatively little data to go on in arriving at any definite decision, and he thought they could only speak in very general terms and say, "the longer the better." Observations on small patches of herbage suggested that three or four weeks was certainly a beneficial period.

Dr. Oldham had some very pertinent remarks to make about progressional grazing and rotational grazing and the effects of the new grassland management on the piling up of parasitic worms. It was very interesting to note that observation, which was made in the field a long time ago by Professor Wooldridge, that the period following a drought was particularly dangerous as regards parasitic gastritis, that the same observation was made with greater definition at a later date by himself (Mr. Taylor) when enquiring into the reasons underlying the epidemic of parasitic gastritis that followed the long drought of 1933-1934, and that this should be confirmed in the experimental observations mentioned by Dr. Oldham.

He thought that most of the points made by Professor Wooldridge had already been covered, namely, his reference to immunity and the observations on parasitic gastritis associated with a period of drought.

With reference to the rotational system which Professor Wooldridge had mentioned: having the pasture divided into three parts, adults on one part, lambs on another, and keeping the third free—he thought any system of that kind was of very great value in keeping down the accumulation of the larvae of parasitic worms. He would suggest, however, that there ought to be a rotation within a rotation: that if the land was to be divided up into three parts like that, and if the piece to be kept for the young animals was to be used by them alone for the whole of the year the system would be rendered a very dangerous one. He thought it a most excellent thing to give one part of the farm a rest by making hay there or ploughing up the ground and raising a crop and that the first lot of animals to go on to that ground when it came into grazing again should be the young ones, but he should think it dangerous to leave them on that part for the whole of the rotational period, presumably twelve months. It would therefore be necessary, he thought, to have a rotation within a rotation, in which the different parts of the ground used for the young animals should be rested at different times.

Professor Wooldridge also made reference to ploughing: he quite agreed with everything the Professor had to say in that connection. It was true that the benefits derived from the plough were not due merely to the burial of the larvae; they were due to giving the ground a rest. There was certainly a great advantage in short leys for permanent pastures for the reason that the ground had a rest from grazing. Nevertheless, one did find in many old text-books and in more recent papers that ploughing was beneficial not only for the reason mentioned by Professor Wooldridge, but also because it buried the infection which already existed beyond the reach of the grazing animal. He thought, however, that that was not so at all, as was obvious when one enquired into the origin of a certain type of outbreak of the disease which commonly occurred where extensive catch cropping was practised as in many parts of Wiltshire and Dorset. With reference to the matter of hay, it was certainly true that the larvae could live through the hay-making process.

Dr. Wooldridge had raised the point of the possibility of those infective larvae in the grass requiring food. That was not so. He believed one or two helminthologists with marked heretical tendencies had suggested that the larvae absorbed certain materials through their skin. In point of fact, however, the larvae were full of food granules which gradually disappeared. He thought the other point raised by Dr. Wooldridge as to the susceptibility of the young and the total number of eggs excreted by the dams being over and above those taken in, had already been covered.

[Dr. Wooldridge: "Do you mean, in your paper, that the total of individuals excreted is less than the number of individuals taken in by the adult on heavily infected ground? If that is not correct your whole thesis of adults and young falls to the ground."]

He (Mr. Taylor) thought the natural state of affairs might be stated in the following way: Suppose one had a horse which was excreting a million eggs in a day and it grazed on heavily infested pasture and as it did so it took in one million larvae. If it was a really resistant horse—an adult in good condition and feeding well—it might be only half a dozen of the larvae so taken in that would ever get a hold and develop to the adult parasitic stage. He thought Dr. Wooldridge wanted to find out, why did the

older animals kill the worms? That was simply the obvious action of the immunity; one could not say exactly how it worked. For some reason the mucous membrane of the intestine was unsuitable for their development.

There were one or two interesting points mentioned by Mr. Worden in connection with the modern grassland improvement and the work of the people at Aberystwyth on new types of grass particularly suitable for grazing. Also on the generally recognised principle that it is good for the grass to intensify the grazing and keep the herbage short. In his opinion, the medium course should be taken, as while intense grazing may benefit the herbage it is certainly very bad from a disease point of view. With reference to short leys, he thought everybody who had made a comparison between short leys and permanent grass was agreed that sheep did much better on the former, but he believed that the people both at Aberystwyth and at Bangor were now wondering whether the improvement was due to the better grass or the reduction in parasitic worms: they were unable to decide.

Another contributor to the discussion raised the question of the possibility of the vigour of the parasitic worms being enhanced through grazing with adult animals, only the more vigorous parasites being able to "take on," and a process of selective breeding through survival of the fittest coming into operation. That seemed to be very reasonable and he could only say that so far nothing was known as to varied virulence among various strains of parasites, and they did not know whether any increase in worm-vigour took place from that cause. It was very desirable to place newly weaned foals on worm-free pasture, but under present conditions that was almost impossible. Even if it were possible to start with worm-free pastures it would be impossible to maintain them free.

He was afraid he had nothing to suggest in connection with the observation that Argentine horses appeared to be particularly susceptible to worms. He knew, however, that parasitic red worms were very common in South America and that they caused trouble there.

Captain Langford brought up a nice point with regard to basic slag. He had suggested that the increase of parasitic gastritis amongst the sheep where pastures had been improved might be due to the fact that there were more sheep there. He (Mr. Taylor) had been into that and found that there were not *more* but *less* sheep than there used to be. Many of the farmers were unable to stock up to the maximum carrying power of the land and in addition to that there had been a marked change in the farming—a big change-over to cattle.

### HERD INSPECTION RESULTS IN PEMBROKESHIRE

The quarterly report of the Ministry's Inspectors under the Milk and Dairies Acts, presented to Pembrokeshire Public Health Committee, stated that during the quarter, 654 cattle in 28 tuberculin-tested herds were examined and found to be free from tuberculosis. The inspectors also examined 626 animals in 32 accredited and standard herds with a similar result. Seven hundred cattle were examined in 97 non-designated herds and only one animal was found affected which was dealt with under the Tuberculosis Order.

There are now 333 attested herds in the county and 203 supervised herds.

The Veterinary Record

April 22nd, 1939.

# Pastures and Helminthiasis

"PERMANENT Pastures Propagate Parasites." This slogan, hatched in the fertile brain of the late Dr. Maurice C. Hall, will remain, with his many valuable contributions to helminthology, a memorial to his pioneer work. Hall's mantle is ably borne in this country by Mr. E. L. Taylor, whose paper to the Central Veterinary Society inspired this editorial. It is evident that our knowledge of the rôle which pastures play in the development of strongyloid diseases has progressed far beyond that suggested by the slogan.

Strongyloid diseases constitute one of the gravest problems which beset the new drive towards the increased productivity of our land. The extended use of lime is evident to all who move in rural communities and basic slag and permanent pastures full of wild white clover go hand in hand. The general tendency of modern pasture management is towards the production of those conditions which set the stage for an outbreak of parasitic gastritis, husk or parasitic enteritis.

While the traditional practices of the grazier are often, unwittingly, based on principles which tend to control parasitic diseases, the improvement of grazing and the increase in the carrying capacity of the land may vitiate the benefits of his rule-of-thumb methods. Only by a deep understanding of the underlying principles can methods which have been successful in old conditions be adapted to new circumstances.

An appreciation of the fundamental difference, in the production of disease, between infection by bacteria and infestation by parasitic worms is essential. Each strongyloid worm of any infestation must have been ingested as an infective-stage larva. Contamination of the pasture is of supreme importance; decontamination our main defence. But the weapons of the A.R.P. squad are not applicable, for we cannot mechanically remove the worm ova from the pastures nor, as yet, can we apply an agent which will destroy infective larvae and leave the herbage green. One must, then, know the "way of nature" and adapt the management of the pasture to assist her cleansing action. Nature holds her secrets closely, but it is encouraging to observe that those relating to

this problem are being wrested from her grip and that much of this work has emanated from the Ministry of Agriculture's Veterinary Laboratory. The paper published in this issue and the discussion which it evoked illustrate the real advance of recent years and how this knowledge may be applied to the control of this national problem.

While the value of early and energetic dosage with suitable anthelmintics should not be overlooked, it is evident that much good may be expected from sound advice on pasture management and grazing. Unfortunately, advice is rarely sought when it might best be applied and often it is only the spectre of heavy loss in an obviously affected flock, herd or stud which makes the owner seek professional aid. Yet, that contact may well be followed up by a close study of the conditions under which the outbreak has occurred and, using our newer knowledge, by recommendations which will at least reduce the possibility of future losses.

## THE ZOOLOGICAL SOCIETY

A decrease of 130,885 in the number of visitors to the Zoo last year, compared with 1937, which is shown in the annual report of the Zoological Society issued on April 14th, is attributed mainly to the September crisis. The total was 1,816,012. At Whipsnade there was an attendance of 523,345, a decrease of 23,073.

The number of visitors to Regent's Park was the twelfth highest in the history of the Society. Admission receipts were £5,628 less than the previous year, and total income amounted to £112,957, a decrease of £12,165. Expenditure was £112,488, a decrease of £5,061, leaving an excess of income over expenditure of £469. Receipts for admission to Whipsnade decreased by £1,077. Income was £33,575, a decrease of £2,421, and expenditure was £27,568, a decrease of £738, giving an excess of income over expenditure of £6,007.

The average strength of the Society's collection, excluding aquarium, reptile and insect houses, was 1,035 mammals and 1,846 birds. The animals at Regent's Park consumed 91 tons of hay, 156 tons of clover, 124 tons of horseflesh, nine tons of monkey nuts, twelve tons of bread, 244,649 bananas, and 4¼ cwt. of honey.

The aquarium was visited by nearly 15 per cent. of those who entered the gardens. The visitors numbered 283,248, compared with 271,933 in 1937. The increase was largely due to the reduced charge of sixpence on Saturdays, instituted during the year.

In September, it is stated, a scheme was worked out for measures in case of war or other emergency. This involved the conversion of basements into air raid shelters, and the removal of valuable books and documents and the families of the staff to Whipsnade.

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**There are now 633 producers of tuberculin-tested milk in Somerset, according to a report of the County Milk Committee to the Somerset County Council.**

## CLINICAL COMMUNICATION

# A Few Interesting Cases

R. E. S. TUCKEY, M.R.C.V.S.,
WHITCHURCH

Some time ago I was called in to attend an aged Shorthorn cow which had difficulty in calving. On examination I found a breech presentation, two legs and two tails being presented. On further examination two distinct sets of vertebrae could be felt. I decided to try traction, and chloroform was administered. Pulleys and blocks were applied. After considerable difficulty the calf was delivered and was found to possess two heads and four front legs. Another normal and fully developed calf was delivered immediately afterwards. The photograph clearly depicts the size and abnormalities of the first calf.

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Recently I was asked to go at once to see a cow which was in great pain. On arrival I found the animal to be a six-year-old Friesian cow which was obviously greatly distressed. She was alternately getting up and lying down, kicking at the belly, licking herself in different places and moaning. Having seen several such cases I was able to give the owner an accurate prognosis and to outline the probable course the condition would take; but my diagnosis was very guarded. I saw the animal again about ten days later and, as I expected, all the

non-pigmented part of the skin had begun to peel off. Three weeks later the whole white part of the skin had dried up and peeled off. I have seen several such cases during the past few years and they have all been in "two-coloured" cows, and in each case the white portion of the skin has dried up and peeled off. I have never had a fatal case, and I have never been able to give a satisfactory explanation. Perhaps some of my colleagues could help me.

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### Tetanus and Other Conditions in Horses subsequent to Lime "Sowing"

Two years ago I was called in to attend an aged Shire horse with a bad wound in the foot. I was informed that he had been "sowing" lime for about three weeks, but the wound had been observed only the day before. I noticed the animal moved stiffly, and tetanus was suspected. I saw the animal again next day, and there was no doubt about the diagnosis. I advised the owner to have the animal shot to prevent suffering, but he insisted on treatment. It lived exactly a week.

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Last year I attended a four-year-old Shire mare which the owner informed me was very stiff and off her feed. It turned out to be a definite case of tetanus. This mare had "sown" all the lime on the farm, but no wound of any description could be found. As the animal was getting much worse she was destroyed on the third day.

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Last month I was called to a three-year-old Clydesdale gelding which was down in the field and unable to get up. There were all the typical symptoms of tetanus—twitching, quivering tail, and—much to my delight, as I have seldom been able to demonstrate it in such cases—when the head was pushed back the third eyelid practically covered the eye.

The owner informed me that this horse and another had "sown" all the lime on the farm. Two days before he had noticed this animal a bit "off colour," and the day before noticed him to be slightly stiff and "poking" his nose. The animal was destroyed immediately.

Three days later the same owner asked me to go and look at the other horse, which seemed very dull. I examined the animal but could detect no symptoms of tetanus. The owner informed me that "the bowels had not moved" for 48 hours. A mild purgative was administered and warm clothing applied. I saw the animal again next day. There were definite symptoms of jaundice, the eyes, mouth, nostrils, etc., being "as yellow as a guinea." Later this condition cleared up, leaving the mucous membranes a glaring red. I called in Mr. A. MacKenzie, F.R.C.V.S., as a second opinion. He agreed with me that the condition was due to inhaling the lime or swallowing it, or both. The animal lived three weeks but never took any food voluntarily, existing only on gruels, milk, egg, etc., administered in the form of a drench. Strange to say, this horse appeared as if he would eat, but on going up to the manger quite eagerly, would suddenly withdraw as if the very thought of swallowing was agony.

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A week ago I was called to a three-year-old Shire horse which was very swollen around the eyes and mouth. He also had been spreading lime. The condition was purely local and soon responded to treatment. This owner made a statement which gave me food for thought. He said that this horse, being young, was worked with the bit in his mouth. This, together with the lime, often causes chafing of the corners of the mouth and as the animal is out at grass it is possible that the tetanus bacilli may have found entrance at this point. I happened to be speaking on the telephone to Dr. Davies, of Liverpool University, on another subject, when I happened to ask him if he could give any explanation of why horses should contract tetanus after spreading lime. I understood him to say—I hope he will forgive me for mentioning his name without his consent—that it was most interesting, as, in laboratory experiments it is very difficult or impossible to produce symptoms of tetanus by injecting the tetanus bacillus or toxin unless calcium is injected at the same time.

## HONOUR TO DR. K. I. SKRIABIN

**We were pleased to note that among the members elected to the Academy of Sciences of the U.S.S.R., which took place in Moscow on January 28th and 29th at a general session of the Academy, was Dr. K. I. Skriabin, an outstanding authority on veterinary science. In addition to 56 new academicians, 102 member-correspondents were also elected.**

## ANNOTATION

# Some Physiological Principles in Feeding of Domestic Animals

This annotation deals with three papers given at the 13th International Veterinary Congress, one of which is mainly informative, one constructively speculative, and the third open to misconception and therefore to criticism.

(1) **Animal Nutrition in South Africa.** J. I. Quin, Onderstepoort, Union of South Africa.

Professor Quin deals with the present status of research on animal nutrition in South Africa, paying particular attention to pastoral conditions as influenced by soil, rainfall, and solar radiation.

Since cultivation on a large scale, of crops specifically for animal feeding, is the exception rather than the rule the great majority of animals in South Africa is dependent upon the quantity and quality of the natural vegetation. On the whole this is satisfactory during the rainy summer months, and even on poor soils with low rainfall, low yields per acre can be balanced by increasing the unit grazing area per animal. During the rainless winter, however, there is deterioration of quality and actual shortage of readily assimilated carbohydrates for energy purposes may ensue. On wide stretches of cheap rough grazing land grass is not cut for hay, the seed is allowed to fall, lignification proceeds apace, and only a coarse fibrous stubble is left for winter requirements. Attempts to allow for deterioration involve limiting the stock carried per thousand acres to the capacity of the winter grazing and thus making inefficient use of the summer growth. Solution of such problems involves transition from the present extensive system of farming to a more intensive one involving timely provision of supplementary foodstuffs stored for winter use.

Apart from gross quantitative deficiencies of this kind qualitative factors come into account, the most notable being a wide-spread deficiency of phosphorus leading to defective growth and lowered fertility of the stock, or in extreme cases to osteomalacia and rickets. This is easily remedied by a supplement of bone meal or cheap phosphatic mineral mixture in moderate amount. Not so easily remedied is a shortage of good quality proteins only preventable by altering the character of the pasture or growing high protein foods such as legume crops. Vitamin A deficiency may possibly occur under conditions of prolonged drought but this is the only vitamin deficiency suspected. Vitamin D is adequate because of the high solar irradiation. Apart from phosphorus no specific mineral deficiencies such as those involving iron, copper, cobalt or iodine, have been demonstrated.

An important consideration in the drier regions is water supply. Absence of streams or other open water necessitates the sinking of bore-holes for watering stock. As the grazing in the immediate neighbourhood of these is eaten down the animals have to traverse increasing distances daily, with consequent consumption of "walking energy." Indeed the balance between the energy obtainable from poor winter grazing and the energy wasted in travelling to and from the water supply may involve serious loss of bodily condition at certain seasons of the year.

Experiments conducted at Onderstepoort showed that the water consumption of sheep is largely determined by the quality of their food, diminishing on poor quality roughage and rising to an optimum on a well-balanced diet as the total metabolism increases.

Brief reference is made to the author's own investigations on the physiology of ruminants, involving the motility of the gastro-intestinal system, fermentation in the rumen and the influence of protozoal fauna in predigestion of food in the fore-stomachs.

(2) **Physiologische Grundzüge für die Ernährung der Haustiere.** B. Sjollema, Utrecht.

In this paper Professor Sjollema discusses the rôle of biocatalysts in regulating the speed of metabolic processes, the maintenance of physico-chemical constancy of the fluids bathing the tissues, growth and replacement of tissue wear and tear, provision of energy and production of meat and milk.

Since the article itself is a compact survey it does not readily lend itself to further condensation, but a few salient points may be selected.

Under the heading of biocatalysis it is pointed out that there is no sharp distinction between enzymes, vitamins, hormones and even certain minerals. Vitamins are not always derived from the food but in some cases can be synthesised within the body, while certain hormones are not only manufactured in endocrine organs but can also occur in plants. Hormones and vitamins sometimes act together, as in the case of thyroxin and vitamin A, and sometimes antagonistically as in the case of folliculin and vitamin A. With some enzymes, *e.g.*, carboxylase, the active component is itself a vitamin, and for some hormones a mineral element is essential, *e.g.*, iodine in the case of thyroxin and iron in the case of certain "redox" catalysts (reduction-oxidation processes).

The practical problem arises in considering the extent to which certain substances must be present in the food and the extent to which they can be synthesised in the body, *e.g.*, whether pigs and cows which, unlike the guinea-pig, synthesise their own vitamin C, really do synthesise it sufficiently easily for optimal production.

Under the heading of the significance of the "Milieu-interieur" of Claude Bernard, the importance of electrolytes, particularly sodium chloride for maintenance of osmotic pressure, is discussed. Reference is made to balance of electrolytes in relation to nervous responses, and balance of acid and basic components of food in relation to *p*H of body fluids.

Discussion of digestive processes is omitted and the value of food components for energy, fat production and milk formation, is dealt with on orthodox lines. With regard to minerals the deficiency aspect of phosphorus, calcium, sodium, iron, copper and iodine, is touched upon. For young pigs, calves and chickens 0·5 per cent. Ca, 0·4 per cent. P and 0·2 per cent. Na, expressed on the dry matter of the food, is regarded as desirable, half these quantities being sufficient when the phase of rapid growth is over but allowing about 2·5 grm. Ca and P for each litre of milk produced.

(3) **Wesen und Bedeutung des Mineralstoff-verhältnisses im Futter mit Rucksicht auf die Kalk und Phosphor versorgung des Tierkörpers.** O. Wellmann, Budapest.

In this paper Professor Wellmann deals with the "significance of the mineral content of food in relation to calcium and phosphorus provision for the animal body." It is largely based upon the researches carried out, for many years now, by the author in collaboration with Marek and Urbányi, stresses the conception of the so-called "Erd-Alkalizität," or E.A., favoured by these authors and introduces the semi-controversial element by referring to the views of Theiler and co-workers who discounted the specific value of E.A. as an index of much practical value. Since Wellmann thinks that opposing views may be due to a misconception on the part of the Onderstepoort workers he discusses the matter afresh in the light of other conceptions such as Ca/P ratio and absolute daily intake of Ca and P.

An Explanation of "E.A." (Erd-Alkalizität)

Since deductions from E.A. are not popular except with those influenced by the Marek school, and with German agriculturists influenced by Ibele, the originator of the term, while British veterinarians rarely know what E.A. means, some explanation may not be out of place. Such explanation is all the more necessary in view of the very bad translation in the English version of the summary provided for the International Congress, in which phrases such as "judicious relation in the salts content better determined by the rate of alkalinity in ground alkaline" will certainly puzzle the uninitiated. The correct translation of "Erdalkali-Alkalizität" is "alkalinity in respect of alkaline earths," the term "alkaline earths" being an old one for lime, magnesia, baryta and strontia.

The term E.A. as expounded by Ibele on the agricultural side and popularised by Marek and co-workers on the veterinary side over 15 years ago (*e.g.* Marek, *Archiv. f. Tierheilkunde* Bd. **51,** Heft 1, 1924) was used in relation to the figure obtained by adding the "milligramme equivalents" of CaO and MgO, subtracting the milligramme equivalents of $P_2O_5$, and expressing the difference "per 100 grm. dry matter" of food. This figure is obviously positive if the bases lime and magnesia exceed the acid equivalent of the phosphate, and negative if they do not. Expressing in terms of chemical equivalents of course expresses "combining proportions" of acid and base. Milligramme equivalent is simply the equivalent weight, *i.e.*, the molecular weight divided by the valency, expressed in milligrammes. Thus, the calculation for a food containing 0·84 per cent. of CaO on a dry-matter basis would be:—

$$\frac{40 + 16}{2} \text{ i.e., } \frac{\text{(the atomic weights of Ca and O)}}{\text{valency of Ca}} = 28$$

0·84 per cent. = 840 mg. per 100 grm.

Milligramme equivalent of lime is . ·.

$$\frac{840}{28} = 30$$

In similar fashion "Alkali-Alkalizität," or A.A., was used to denote the preponderance, or otherwise, of "soda" and "potash" over the acid radicles "chloride" and "sulphate." Organic acids were ignored on the assumption that they would be combusted to carbon dioxide in the body, and the physiological functions of carbonic acid as a metabolic acid, and of ammonia as a metabolic base derived from protein in the food, were not taken into account at all despite their obvious importance in physiological regulation of neutrality in the body.

Hence E.A. + A.A. together represented simply the excess of "fixed acids" or "fixed bases" in a ration. A similar conception was sometimes used in this country; for instance, by the Rowett Institute to a limited extent, in the form of excess base or acid expressed as

"c.c. normal reagent." Since 1 c.c. of a normal solution contains 1 mg. equivalent of the substance concerned there was little difference in the mode of expression and so long as the interpretation of the figure was severely restricted it served a moderately useful purpose.

The Marek school, however, laid what the Onderstepoort workers considered too great an emphasis on E.A. and Theiler, Green and du Toit, in their paper on "Minimum Mineral Requirements of Cattle" (*Jl. Agric. Sc.* **16,** July, 1927) subjected this to detailed criticism, at the same time expressing the view that although a particular ratio between minerals in foods may obviously represent an optimum the current emphasis on "mineral balance" was much exaggerated; also the view that "the physiological capacity of the animal to adjust itself to varying ratios is much greater than credited by many authors." That this view is still held by the South African workers is evident from the last paper published by du Toit and Malan shortly after Theiler's death (*Onderstepoort Jl.* **8,** 1 and 2, 1937).

In the present paper of Wellmann greater stress is laid on absolute daily intake than in the earliest papers of Marek, but in the opinion of the present annotator E.A. still receives too much prominence and vitamin D too little. The main conditions for adequate calcium and phosphorus provision in the animal body are stated to be:—

1. Adequate absolute daily amounts of Ca and P in the food.

2. A suitable balance best shown by the E.A. figure.

3. A supplement of vitamin D when the food is deficient in Ca and P or when the E.A. is unfavourable.

Against these views may be set the criticisms:—

(*a*) That if absolute daily amounts are adequate in the sense of being well above physiological minima, as they should be in ordinary feeding practice, neither E.A. nor Ca/P matters much unless the imbalance is very wide. It is only when daily intake is on the borderline of actual deficiency that excess of phosphorus, by imposing a drain on stored base (including calcium of the skeleton) or excess of calcium and magnesium by depressing absorption of phosphorus, becomes of serious consequence. The physiological mechanisms of the body are adapted to dispose of unwanted excess of either acids or bases in considerable amount and there is no need to "balance to a hair" the proportions of minerals in a food so long as there is reasonable abundance of all.

(*b*) That in absence of sufficient vitamin D (or its precursors) defective mineral metabolism can ensue on any value for E.A. at all, or any relative proportions of Ca and P. As du Toit and Malan point out in discussing the 1936 paper of Shohl and Wolbach, rickets may be procured on any relative proportions of Ca and P, and hence the question of Ca/P ratio has "lost much of its significance." Vitamin D is necessary not only when E.A. is unfavourable but also when it is favourable.

(*c*) That the E.A. figure is "theoretically unsound" and should therefore be treated with more caution than respect. Its uses are limited to those who understand its precise significance and it is better replaced by a broad consideration of the total daily intake of minerals treated as a whole in the light of any other physiological factors likely to be involved, *e.g.*, absorption of minerals at different levels of intake and specific vitamin requirements of the animal concerned.

In substantiation of the criticism that the EA. figure is "theoretically unsound" and likely to introduce more confusion than it dispels, the following arguments may be adduced:—

By definition, expressing CaO, MgO and $P_2O_5$ in terms of chemical equivalents,

$$\text{E.A.} = \frac{(\text{CaO} + \text{MgO}) - (\text{P}_2\text{O}_5)}{\text{Dry Matter}} = \pm \text{X}$$

A suitable dietary may well have the bases and acid in chemically equivalent proportions so that neither is in excess and potential neutrality prevails. The numerator will then be zero at all real levels of CaO, MgO and $P_2O_5$, and X will be zero whatever the analysis of the food may be. The answer would be the same whether the animal was swallowing entirely inadequate *grains* or grossly excessive *pounds* of minerals per day.

According to the supporters of the E.A. conception the value of X should be positive and preferably about +25. All that this means is that there should always be a definite excess of calcium and magnesium over phosphorus, a thesis for which there is no adequate evidence and which, if applied to the human race (acid urine) would mean that we are all hopelessly misguided about our real E.A. needs. The fallacy of E.A. is that since the numerator of the formula is a *difference* the magnitude of X has no relation to the *real values* of CaO, MgO and $P_2O_5$. E.A. could be positive, + 25 or any other figure, even if there were no phosphorus in the diet at all. The positive value could be made up entirely of MgO with no calcium at all, so that a ration entirely free from both calcium and phosphorus could have the E.A. of a perfectly balanced ration. Wellmann, of course, saves this *reductio ad absurdum* by saying that the ration must *also* contain the *adequate minimum* of calcium and phosphorus. But what is the adequate minimum? So far as E.A. is concerned the value could be the same

whether the daily Ca and P supply was grossly deficient, barely adequate, reasonably generous, or grossly excessive. E.A. could be the same whether the animal was eating a mineral-deficient diet, or a perfect ration, or consuming a pure mineral mixture.

Obviously a few milligramme equivalents, one way or the other, do not matter at all if the real amounts of minerals are abundant, or well over the borderline of minimum physiological requirements, although they may accentuate the difficulty of subsisting on the borderline when daily intake approaches the danger zone of actual deficiency. The weak spot about the application of any general formula is that it ignores the physiology of the animal; in this case ignores the physiological neutrality mechanisms.

The same criticism, of course, applies to any slavish use of Ca/P ratio as a figure with a meaning in itself. It is quite obvious that 2 grm. CaO and 10 grm. $P_2O_5$ in the ration of a horse has a very different meaning to 5 grm. and 25 grm., and again to 30 grm. and 150 grm., although the ratio is 1 : 5 in all three cases. When both elements are very low there is not enough of either for structural requirements. When both are very high the animal uses its physiological mechanisms to get rid of unwanted excess of each. At some critical intermediate point when the limiting one is "just adequate and no more," excess of the other may exercise an adverse effect, and the wider the ratio between the two elements the more pronounced may be that adverse effect. Excretion of undue excess of phosphorus may be accompanied by a drain on barely sufficient calcium. Undue excess of calcium, by depressing the absorption of phosphorus, may accentuate an aphosphorosis. But as the real quantities of Ca and P rise above the critical level of each the Ca/P ratio becomes less and less important. Many of the racehorses in England are on an adverse Ca/P ratio but this seems to make little difference, so long as the real intake of Ca does not fall too low.

When calcium is dangerously low and phosphorus relatively high, magnesium may, by sparing the drain on calcium, alleviate the adverse effects of a wide Ca/P ratio. But the objection to the use of the E.A. formula is that it *adds* CaO and MgO and incorporates the sum in a *single figure* which hides the summation. It thus treats calcium and magnesium as if they had the same value—a theoretically unsound procedure which makes the E.A. figure identical irrespective of the relative proportions of the two elements.

It is obviously more advantageous to consider the elements *separately*. The real physiological truth, of course, is that magnesium can *to some extent mitigate* any effect of excess phosphorus over calcium, probably by depressing the absorption of phosphate from the lumen of the gut and in any case providing an alternative base with which the phosphorus can combine in elimination as phosphate. But any base can mitigate the effect of excess of fixed acid in a dietary—those which form insoluble phosphates (Ca, Mg) presumably by depressing absorption and facilitating elimination in the faeces, and those which form soluble phosphates (Na, K) by facilitating elimination in the urine without excessive alteration of *p*H.

The extreme instance of an element depressing absorption of phosphorus by carrying insoluble phosphate into the faeces is, of course, found in the so-called "Beryllium Rickets." This condition never occurs in practice but can be produced experimentally by adding sufficient of a beryllium salt to a ration to combine with all the phosphorus as the highly insoluble beryllium phosphate. The rickets then produced is, of course, a simple "aphosphorosis"—the phosphorus in the ration, however high, being simply locked away in useless form and excreted in the faeces without ever having reached the circulation at all. To treat calcium and magnesium in the same category as beryllium would, of course, be absurd, since calcium phosphate, although insoluble in water, is sufficiently dissolved in the alimentary tract to be able to serve as a good source of phosphorus in a ration. Nevertheless large relative excess of calcium or magnesium can probably *depress* the absorption of phosphorus—presumably by depressing ionisation of phosphates only slightly soluble at the *p*H range encountered in the intestinal tract.

A third theoretical weakness of the E.A. formula is the mode of expression on the "dry matter," although this weakness is trivial in comparison with those already mentioned. Theoretically it would mean that the actual value of E.A. in highly digestible concentrates would be halved merely by adding an equal proportion of indigestible mineral-free roughage (*e.g.*, cellulose). Wellmann justifies this part of the procedure by saying that the mineral content of natural foods high in fibre is less available in digestion, but the extent to which this is true is a highly debatable point, despite the general teaching of many agricultural textbooks. There is no evidence that Ca, Mg and P are equally affected by fibre and the availability of minerals is certainly not arithmetically "inversely proportional" to the fibre content. The degree of utilisation also varies with level in the food and there are very rough grazings in various parts of the world upon which the animals make astonishingly effective use of the low mineral content shown by analysis. It must also not be forgotten that the more fibrous and less digestible a natural herbage is the *more of*

*it* an animal has to eat to cover its essential energy requirements and hence the higher the actual daily intake of the contained minerals becomes. On the assumption that the actual quantity of a pasture eaten by an animal depends in the first instance on its energy requirements, *i.e.*, that it cannot live without at least covering these, Theiler and Green used "minerals per unit starch equivalent" and Orr used "minerals per 100 caloric portions" as a rough and ready means of estimating total daily intake of minerals irrespective of availability. Wellmann refers to this $P_2O_5$/S.E. relationship as used by Theiler and Green, without, however, seeming to realise the very limited purpose it was ever intended to serve. It merely arose from the fact that on certain pastures analytical figures for phosphorus expressed on the *dry matter* were often very *misleading*. A particular percentage value might be just sufficient on a poor pasture of which large quantities were perforce consumed, but inadequate on a better pasture merely because the animal, in satisfying its appetite with a smaller intake, did not actually ingest sufficient total phosphorus for minimum physiological requirements. The apparent paradox of an animal suffering from aphosphorosis on a pasture relatively nutritious from the point of available carbohydrate and protein and escaping on a less nutritious fibrous pasture of the same percentage phosphorus content, was, of course, readily explained by the fact that the gross food intake, and hence the gross mineral intake, is controlled by the "starch equivalent" or "nett calories" and *not* by the "quantity of minerals on the dry matter." Minerals/S.E. then becomes more significant than Minerals/Dry matter. Incidentally it may be added that the E.A. of two such pastures, nutritious and innutritious in the ordinary sense, need throw no light whatever on their real value. The figure could well be identical because "milligramme equivalents" would merely be divided by "dry matter," irrespective of the digestibility of that dry matter and of the total quantity of food consumed per day.

The use of the ratio (Ca + Mg)/P by some authors avoids the whole question of "dry matter" and of "availability of minerals," and it is for that reason preferable to E.A. when it is desired to bring magnesium into consideration as a *base* functioning alternatively to calcium, but, like Ca/P ratio, its use is obviously very limited. Just as the use of a figure for Ca/P draws attention to a lack of proportion between the essential elements Ca and P in the food, as compared with the proportion in the animal body, so a figure expressing the (Ca + Mg)/P ratio draws attention to the extent to which the possibly adverse effects of excessive phosphorus (at critical levels of calcium) may perhaps be mitigated or neutralised by magnesium. But it does *nothing more*.

In making use of ratios such as Ca/P or (Ca + Mg)/P, calculation in terms of "chemical equivalents" rather than from mere percentage values would, of course, be advantageous since it would then not matter whether data were expressed in terms of Ca, Mg, P, or CaO, MgO, $P_2O_5$. The ratio between "equivalents" would be the same in both cases and the ratio 1 : 1 would always indicate "neutralising proportions," and incidentally the approximate ratio of Ca and P equivalents in the skeleton. The point will be readily appreciated when it is remembered that "c.c. normal reagent" or "milligrammes equivalent" balance one another irrespective of the compound in solution.

The point to be stressed, however, is that any figures at all are dangerous if worshipped apart from the real things to which they are attached and "ratios," "indices," "percentages," or any other type of "statistical notation" can be particularly treacherous if loosely applied. In the opinion of the present annotator E.A., as a single figure for evaluation of "mineral balance" is about the most treacherous that could be invented to catch an unwary veterinarian or animal husbandryman off his guard! In evaluating a ration in mineral content, or in any other respect, the only safe guide is to keep all the possible separate factors *simultaneously in mind*, with particular reference to the physiology of the particular species of animal concerned. The use of E.A. is as limited as that of any other single figure but more liable to "misuse as a statistic" because its method of calculation is elusive to the veterinarian, its theoretical weakness not always obvious except to the biochemist, and above all because it attempts to incorporate too much in a single figure. It is easier to "form a judgment" and "express it in words" by broadly considering the actual total daily quantities of Ca, Mg, P and "dry matter" ingested by an animal, than by juggling with a single E.A. figure which *smothers the real values* of the separate items.

The fact that an assessment of mineral balance on an E.A. basis "sometimes works," of course means nothing—just as the fact that a bare Ca/P calculation is sometimes significant and sometimes merely deceptive and therefore worse than useless. As Theiler, du Toit and Malan put it in their 1937 paper, "'Erdalkali-Alkalizität,' like Ca : P ratio, of which it is a modification, is not the factor which determines whether rickets will or will not develop under conditions of P deficiency, but both are associated with the severity of the complex result produced." These authors

also draw attention to the fact that in much of the original work of Marek, Wellmann and Urbányi, the vitamin D content of the rachitogenic rations was practically nil—a factor which would confuse the issue at any value for E.A. and invalidate any deductions concerning the special virtue of this particular index of mineral balance.

H. H. Green.

## ABSTRACTS

**["White Scour" in Calves and Related Infections.** Stewart, J., and McCallum, J. W. (1938.) *J. Comp. Path. and Therap.* **51.** 4. 290.]

The death-rate in calf populations in the first ten days of life is very high in many parts of the country. Three conditions are mainly responsible for this high mortality, namely, white scour, navel-ill and joint-ill. Although the chief infecting agents are various strains of *B. coli*, vaccines and sera have proved of little use in curing or preventing the disease. It has been found, however, that the colostrum of the mother played an important rôle in the prevention of white scour and allied diseases, and it is suggested in this paper that the essential constituent of the colostrum may be vitamin A. Data from a calf population of 206 are recorded. It is shown that calves born of mothers whose colostrum possessed a vitamin A content of less than 250 Blue Units (Moore's) per 100 ml. were more liable to infections such as white scour, navel-ill and joint-ill than were calves of mothers whose colostrum had a vitamin-A content of more than 250 Blue Units. The results were statistically significant.

J. S.

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**[Studies in the so-called Electrical Stunning of Animals.** Roos, J., and Koopmans, S. (1938.) *Vet. J.* **94.** 10. 376.]

The work with electricity with the object of stunning and for the production of anaesthesia is discussed and work by the present authors with alternating current (*Vet. J.* **90.** 232. 1934), (*Ibid.* **62.** 1291. 1935), (*Ibid.* **63.** 78. 1936) was continued by experiments with intermittent direct current. The conclusions reached, using apparatus similar to that used in slaughter-houses, accord with the views previously expressed by the authors, namely, that neither true stunning nor anaesthesia is produced.

H. E. B.

**[Ulcers—their Healing by Skin Grafting.** Rao, K. S. P. (1938.) *Ind. Vet. J.* **15.** 1. 52-53.]

An account is given of the use of skin grafts in the treatment of a chronic indurated ulcer on the back of a bullock.

The hardened tissues around the ulcer were excised and small pouches were cut to receive the graft. Thin strips of skin were removed from the hump nearby, and adjusted into the pouches. The area was subjected to gentle pressure and then covered with cotton-wool soaked in sterile 1 per cent. saline solution. Another layer of cotton-wool with vaseline was added to keep the first pad moist.

The grafts adhered after six days and the dressings were then discontinued. Recovery was complete in three weeks.

D. D. O.

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**[Attempts at the Cultivation of the Canine Distemper Virus.** Mitscherlich, E. (1938.) *Deuts. tierärztl. Wschr.* **46.** 32. 497-502.]

An account is given of many experiments in which tissue cultures prepared from the spleen, lung, brain and blood of the dog, and the spleen of the guinea-pig were used. Attempts were also made using the allantoic-chorionic membrane of the fertile hen-egg. In none of these experiments was multiplication of the virus demonstrated.

H. H. S.

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**[Effect of Exercise on Pulse and Temperature of Army Horses.** Mohr and Seele. (1937.) *Zschr. Veterinärk.* **49.** 10. 337-351.]

In troop horses doing moderate work (one hour's duty in the riding school) there was found an average increase of about 1° C. in rectal temperature, whilst the pulse-rate rose by about ten beats per minute. Similar results were obtained with heavy horses doing farm work. In almost every case the temperature began to fall about ten minutes after the conclusion of the work, but took some 60 to 90 minutes to return to its resting value. The pulse-rate, however, returned to normal within 15 minutes in nearly every case. There appeared to be no consistent relationship between the elevation of temperature and the increase in pulse-rate.

During severe muscular exercise the temperature rose rather more in older horses (average 2° C.) than in young remounts (average 1·4° C.) In both lots, however, the return to normal took about the same length of time.

A. R.

## REPORT

[**City of Johannesburg:** Report of the Director of Abattoir, Live Stock Markets, Veterinary Services, Ice and Cold Storage Department. July 1st, 1937, to June 30th, 1938.]

During the year under review 812,000 animals were slaughtered in the Johannesburg abattoirs, whilst 1,388,160 animals passed through the livestock markets. The Director complains of the overwhelming numbers of inferior scrub cattle of low nutritive value arriving in the livestock markets and realising from £3 to £6, whereas in other countries they would realise only £1 to £1 10s.

The percentage of measley beef is still high, and is higher in the export cattle than in those destined for home consumption. Additional shoulder incisions in meat inspection are not allowed for the export carcases. The export of chilled beef is still intermittent owing to the poor quality of the animals slaughtered.

The livestock markets and abattoirs are not run for profit, and the total cost of all facilities, including veterinary inspection, works out at the low sum of 3½d. per animal for the livestock markets, and 1s. per animal for the abattoirs. The sum of 1s. 6d. per ox covers indemnity against condemnation of the carcase in meat inspection, but in view of the Pan-African Health Conference (1935) resolution against insurance schemes to cover measley carcases, the question of that type of insurance is now under review. Measles or bladderworm infestation is exempt from insurance for export cattle, as the exporting farmer is expected to set an example in the eradication of the disease.

Dr. Martinaglia, D.V.Sc., M.Sc., B.V.Sc., gives an account of the method of cutting into carcases for the detection of measles. Incisions are made into the musculature behind the elbow and into the shoulders and head muscles.

During the year the average numbers of animals in the municipal service were 1,595 mules, 83 horses, and 290 oxen. In all, 347 dairies were visited and 15,421 cows examined, whilst 12 cases of generalised tuberculosis were detected.

As regards laboratory experiments, some sterile siliceous dust was mixed with milk sediment from tuberculous cows, and injected into guinea-pigs. It is said that guinea-pigs develop tuberculosis more quickly when infected milk or centrifugalised sediment thereof is mixed with sterile dust and injected intraperitoneally. In most cases generalised infection was noticed on the ninth day. Direct isolation and cultivation of tubercle bacilli on "Herrald egg medium" gave good results. Infected milk sediment was treated with 5 per cent. sodium hydroxide prior to seeding. In one case growth was noticed on the seventh day. When milk infection is very slight the biological test is stated to be more reliable.

Numerous zoo animals were treated and autopsied, whilst tables are given showing the meat condemned and diseases encountered. The report indicates a year's hard work, well done, and one notes with regret that Colonel Irvine-Smith intends retiring in August after 32 years' service. May he have good health to enjoy his well-earned retirement.

D. J. A.

### THE WORLD RECORD COW

A further world milk yield record has been set up by Cherry, the non-pedigree Shorthorn cow owned by Messrs. Wort and Way, of Red House Farm, Amesbury, Wilts.

At noon on April 9th she completed a recorded 365 days, and she has given in that time 41,644½ lb. of milk, which equals 4,164 gallons. She beat by 3,038½ lb. the record previously held by an American cow, a Holstein Friesian, Carnation Ormesby Butter King, whose record for the 365 days was 38,606 lb. Cherry's average daily yield has been eleven gallons three pints. As recorded in our issue of April 8th, she is the first cow in the world to yield 4,000 gallons in a year.

"Her owners, Messrs. Wort and Way, invited a number of prominent agriculturists to attend her last milking on the 365th day," says *The Times*. "Cherry is a cow of Shorthorn type. No one knows her origin. She was one of eight heifers knows her origin. She was one of eight heifers bought in Salisbury market by Mr. Frank Wort for an average price of £20 10s., and for four years she was in one of the bail herds living out on the Wiltshire Downs. At her last calving she was brought down to the farm and since then she has been the constant care of Mr. Alec McKie, who manages this farm, and his young son.

"Milked four times a day, Cherry has maintained an average yield of over eleven gallons a day. At the end of her record she looks remarkably fit and has gained 2 cwt. in weight through the year, which speaks well for her digestion and constitution. This is a performance which reflects great credit on those responsible for the management of this cow. As Mr. Robert Boutflour said at the luncheon which was held in her honour, there are probably several other cows in the country which, if managed with similar skill, would also produce remarkable results.

"While every one can be pleased that the world record has been regained by England there will be many who will think that such freak performances make little contribution to the progress of dairying. That may be true, but a record acts as a stimulus and if the ordinary farmer can never hope to have 4,000-gallon cows in his herd this performance is evidence of the possibilities of skilled management in raising the standard of milk production."

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The Johannesburg Health Department has discovered psittacosis in pigeons in the city and has issued a warning to the public to take precautions.

## REVIEW

**Index of Diagnosis.** By Hamilton Kirk. Baillière Tindall & Cox. 30s. 572 pp. 287 illust.]

It has been well said that every student of disease should be brought up in the homoeopathic school of materia medica. For whether one agrees or not with the theory of this school of healing, there is no doubt that the close observation of the "symptomatic symposium" breeds a race of close and accurate observers. Until the symptomatic history of the patient is set out with a detail that is astonishing to the allopathic disciple, your true homoeopath does not seek for and exhibit the appropriate remedy. One of the most striking features of the veterinary practitioner of a generation ago that many a middle-aged practitioner of to-day can recall to memory when he started first to see practice, was the uncanny powers of acute observation that these older men possessed. Their stock in trade was primitive and scanty, but they arrived at conclusions by means of eye, ear and touch, that many of us to-day would fail to reach if we were suddenly deprived of the armamentarium of apparatus that in this mechanical age are common objects of the consulting room.

The Index of Diagnosis is a kind of recall to symptomatology. It might well have been called an encyclopaedia of symptoms. One hates to use over again the well-worn phrase "indispensable to every practitioner," but in respect of this book it is for once unequivocally true. "It is the primary intention of this book to aid the practitioner in differential diagnosis . . . you look up the symptoms . . . and you find all the possible causes for that set of symptoms."

The work is confined to canine and feline practice, and will especially commend itself to the rural practitioner in need of a vade mecum over ground where his everyday work brings him into less frequent contact with the smaller animals. The radiographic aspects of small-animal work are, as might be surmised, unusually complete. Methods of treatment indicated are up to date, and the numerous illustrations help out the text most admirably.

In welcoming the Index of Diagnosis to our libraries, we wish it a long and useful career both here and abroad. May its appearance inspire the production of similar volumes on the horse as well as the other domestic species.

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**Believed to be the oldest pony in Britain, Tommy, a bay, owned by Mr. A. J. Whiddon, of Sowdens Farm, Brampford Speke, Devon, has just died, aged 44.**

## N.V.M.A. DIVISIONAL REPORTS

# South-Eastern Veterinary Association*

### ANNUAL MEETING AT MAIDSTONE

The twenty-seventh annual general meeting of the South-Eastern Veterinary Association (Division, N.V.M.A.) was held at the Royal Star Hotel, Maidstone, on March 23rd, 1939.

The President, Mr. F. Crowhurst, was in the Chair, and the following Fellows and visitors signed the attendance book: Fellows—Messrs. E. P. Barrett, W. P. Blount, J. G. Cattell, F. A. Crowhurst, J. B. Dier, H. Gooch, H. P. Hogben, J. F. Macdonald, F. Marks, C. W. Perrin, G. S. Peyton, C. Roberts, C. Rose, A Spicer, J. S. Steward, F. B. O. Taylor, Mrs. A. Thomson and Mr. A. Thomson (Hon. Secretary); Visitors—Messrs. E. B. Dixie, E. F. Higginson, Major Hamilton Kirk, Professor W. C. Miller, Messrs. T. B. McClure, J. Roberts, D. Sherriff and Dr. W. R. Wooldridge (Hon. Secretary, N.V.M.A.)

The minutes of the autumn meeting, published in the *Veterinary Record* of February 25th, 1939, were taken as read and signed as correct.

Apologies for absence were received from: Sir Frederick Hobday, Professor T. Dalling, Dr. R. F. Montgomerie and Messrs. E. Ebbetts, S. F. J. Hodgman and H. Taylor.

*Election.*—Mr. R. C. U. Fisher was unanimously elected a Fellow of the Society.

*Resignation.*—A letter was received from Mr. W. D. Halfhead intimating his wish to resign from the Society as he is no longer in practice.

#### Election of Office Bearers

The following were elected office bearers for the ensuing year:—

*President.*—Mr. E. P. Barrett.

*Vice-Presidents.*—Messrs. F. Crowhurst, A. Spicer, J. G. Cattell, Dr. A. D. McEwen, S. F. J. Hodgman and C. Crowhurst.

*Hon. Secretary and Treasurer.*—Mr. A. Thomson.

*Council.*—Messrs. A. T. Crowther, J. B. Dier, F. C. Gillard, H. P. Hogben, F. Marks, C. Roberts and Major G. E. Oxspring.

*Representatives on Council, N.V.M.A.*—Dr. R. F. Montgomerie, Mr. A. Spicer, and Hon. Secretary.

*Representative on V.V.B.F. Council.*—Mr. A. Whicher.

*Hon. Auditors.*—Messrs. H. Taylor and A. Whicher.

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*Received for publication March 29th, 1939.

### Secretary and Treasurer's Report

The Hon. Secretary now presented his report, which was as follows:—

During the year three meetings were held. The first, the Annual General Meeting, took place at Maidstone on April 7th, 1938. An interesting paper, illustrated by lantern slides and entitled "The Probable Significance of some Nutritional Factors in Relation to the Common Unsoundnesses in Horses," was given by Dr. J. T. Edwards. The paper gave rise to an interesting and instructive discussion. The Summer Meeting was held on June 30th, 1938, and took the form of a Joint Meeting with the Central Veterinary Society, when a visit was paid to the Wellcome Physiological Research Laboratories, Beckenham. Members were welcomed by the Director, Dr. R. A. O'Brien, and a tour of the Laboratories followed. The company was entertained to tea, during which a delightful, informal discussion took place. The third meeting was held at Tunbridge Wells, on November 10th, 1938, when Dr. Montgomerie, of the Wellcome Physiological Research Laboratories, gave an address on "The Potency of Synthetic Medium Tuberculin for use in the Double Intradermal Test in Cattle." The paper gave rise to a lively and instructive discussion.

The attendances at the various meetings were reasonably good, the number of members present at the respective meetings being 21, 27 and 24. Ten visitors attended during the year. Six new Fellows were elected and four resignations were accepted, making a total membership of 51, with, in addition, five honorary Fellows.

*Finance.*—The financial statement for the year ending December 31st, 1938, shows a balance of £18 15s. 10d. Subscriptions outstanding at the end of the year amounted to £13 2s. 6d., which, if added to the balance, would give the latter a more rosy appearance.

*Induction of President.*—At this stage of the proceedings Mr. Crowhurst vacated the Chair in favour of the newly elected President. Mr. Barrett then proposed a vote of thanks to the retiring President. This was received by the Fellows with acclamation.

*Talk by Professor Miller.*—Professor W. C. Miller, of the Royal Veterinary College, then gave his informal talk on, "An Unusual Type of Illness among Grass-fed Cattle." This talk was much appreciated by the Fellows and visitors and a lengthy and interesting discussion followed. A vote of thanks to Professor Miller was proposed by Mr. J. S. Steward, and the Fellows showed their appreciation of a most interesting discourse in the usual manner.

### Resolution

Following this, Mr. A. Spicer brought forward the following resolution:—

> "That the method of electing the Council of the N.V.M.A. is now out of date and that a small special committee be appointed to suggest ways and means of making the election more democratic and of giving every member an equal vote."

Mr. Spicer, in supporting his resolution, said: In a democratic country like England, it is a generally accepted principle that if a body of men is to be truly represented by a council, that council must be elected by the whole of that body on the terms of one man one vote.

It has been claimed that the Council of the N.V.M.A. represents the profession, but that is not correct, and never has been, because out of the 3,600 members, only about 2,000 have joined the N.V.M.A.—actually four-sevenths of the total.

The Council consists of the President, Past-President, Vice-Presidents, Hon. Treasurer, Hon. Secretary, the Hon. Secretary of each Division of the Association, one representative for every 35 members or portion thereof from each Division, and two representatives from each Branch of the Association, *viz.*, the President and Hon. Secretary.

Owing to circumstances that never could have been envisaged when the Association was first formed, the election of the Council has become chaotic and totally unrepresentative.

The first Council consisted of 75 members, but the number of Divisions has increased, and the number of members who belong to two or more Divisions has increased enormously, thus making the voting fictitious. Some member may belong to as many as 15 Divisions, and would therefore be responsible for half a member of the Council, and the Council is now much too large. The Society of Practitioners and the "Central" are probably the best examples of this anomaly in a greatly exaggerated form. In one Division of which I have a list, out of the 48 members, 19 to my knowledge belong to other Divisions, and that number may not include all of them.

Another abuse that has crept in is best illustrated by the Society of Veterinary Practitioners. That Division has about 500 members, 75 of whom are not members of the "National," and yet the latter are responsible for two members of Council. This anomaly is present in most Divisions, but to a much smaller extent.

Owing to the wording of the articles of association, the votes of some members are worth more than others. The wording in question is "One representative for every 35 members or portion thereof." Therefore if a Division has 36 members, it can claim two representatives, and each member of that Division has two votes instead of one.

At present the "National" has 2,000 members, but out of that number only those

who belong to a Division have a vote in the election of Council; so that somewhere about 1,300 members are not represented.

Members of the Council are elected annually, at the general meeting of the Division; this means that a member of the Division who is not able to attend on a certain date and at an uncertain time is disfranchised.

Lastly, any member of the profession living abroad, although he may be a member of the "National" and also of a Division, does not have a vote.

I think I have said enough to show that my resolution is justified, and should be sent by this Division to the Council of the N.V.M.A. for consideration.

The resolution was seconded by Mr. J. S. Steward and carried unanimously, and the Secretary was instructed to forward it to the General Secretary of the N.V.M.A.

*Co-operation with the P.D.S.A.*—Discussion on the letter received from the President of the Royal College of Veterinary Surgeons in connection with the arrangements made between the Council of the College and the P.D.S.A. was initiated by Mr. Barrett, and after many points had been debated the following resolution from the Chair, seconded by Mr. Dier, was unanimously adopted:—

> "This Division views with concern the rapid development of the proposed arrangement between the Royal College of Veterinary Surgeons and the People's Dispensary for Sick Animals. It urges that the Council of the N.V.M.A. should initiate a very careful enquiry into the probable results of such an arrangement and should try to secure adequate professional representation in its control."

The Hon. Secretary was instructed to forward the resolution to the General Secretary of the N.V.M.A.

During the afternoon the Fellows and visitors were entertained to tea through the kindness of the retiring President, Mr. F. Crowhurst.

A. Thomson, *Hon. Secretary.*

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# Dumfries and Galloway V.M.A.*

## ANNUAL GENERAL MEETING AT DUMFRIES

The annual general meeting of the above Division was held in the Station Hotel, Dumfries, on Tuesday, November 22nd, 1938.

The Chair was occupied by the President, Mr. John Cameron, Carlisle, and the following other members attended: Messrs. J. Barr, J. G. Bell, J. C. Bennison, G. D. W. Davidson, A. S. Ferguson, F. A. Gordon, T. B. Fleming, N. W. Keith, A. J. Kennedy, A. B. Kerr, J. A. McKinnon, J. McQuaker, A. J. Milligan, G. H. Nicholson, I. G. Macmillan, R. Craig Robinson, Q. M. Service, J. Waddell, D. G. Wishart, A. Young, and G. A. Sangster (Hon. Secretary).

Apologies for absence were received from Messrs. W. T. Hewetson, W. G. Robinson, A. Edgar and P. McKinlay.

*Nomination of New Members.*—Mr. A. B. Kerr, proposed by the President and seconded by Mr. A. S. Ferguson; Mr. D. M. Alexander, proposed by the President and seconded by Mr. F. A. Gordon; and Mr. E. Prentice, proposed by Mr. F. A. Gordon and seconded by Mr. N. W. Keith.

*Financial Statement.*—The Hon. Treasurer submitted a statement on the financial position of the Division for 1937-38. It was agreed that the usual annual subscriptions be paid, namely: R.C.V.S. Library Club, and the Victoria Veterinary Benevolent Fund.

*Correspondence.*—The Secretary read a letter from Mr. R. Simpson, in which he stated that on account of his having been transferred to London to take up an appointment under the Ministry of Agriculture and Fisheries, he desired to tender his resignation as a member of the Dumfries and Galloway Division. It was carried unanimously that, in view of his past services, Mr. Simpson be elected an Honorary Member of this Division. The Secretary was asked, on behalf of the members, to convey to Mr. Simpson their best wishes in his new sphere.

### Election of Office Bearers

The following gentlemen were unanimously elected office-bearers for the ensuing year:—

*President.*—Mr. A. S. Ferguson (proposed by the President and seconded by Mr. Milligan).

*Vice-President.*—Mr. J. Cameron (retiring President).

*Hon. Secretary and Treasurer.*—Mr. G. A. Sangster.

*Auditors.*—Mr. A. Young and Mr. A. J. Kennedy.

*Representatives on the Council of the N.V.M.A.*—The President and Secretary.

*Representatives on the Council of the Scottish Branch of the N.V.M.A.*—The President and Secretary.

It was proposed, seconded and unanimously agreed to refund to the Secretary part of his expenses incurred while attending Council and committee meetings, as representative of the Division.

Following the business meeting members adjourned for lunch, after which Mr. J. E. Wilson, B.Sc., M.R.C.V.S., Royal (Dick) Veterinary College, Edinburgh, gave an address on

*Received for publication March 27th, 1939.

Poultry Diseases. Mr. Wilson, who followed his address with a series of informative demonstrations, was accorded a vote of thanks for his contribution to the proceedings.

Since Mr. Cameron was now vacating the Presidency he was thanked for his services during the year.

GEO. A. SANGSTER, *Hon. Secretary.*

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# Central Veterinary Society

Animal husbandry is a science nowadays claiming and securing national attention, and it is therefore fitting that one angle of the veterinary aspect of the matter, as represented by Mr. E. L. Taylor, M.V.Sc., M.R.C.V.S., D.V.H., in an address on "The Role of Pastures in the Development of Strongyloid Diseases in Grazing Animals," should have engaged the Central Veterinary Society at the meeting held at the Conway Hall, Red Lion Square, W.C.1, on the evening of March 2nd, 1939. Needless to say, Mr. Taylor's address was an informative presentation of present knowledge —and theories—on this important problem, and its primary purpose of evoking a well-sustained discussion was admirably fulfilled.

The President (Mr. Nevill S. King) occupied the chair and there were also present Miss M. L. Bingham, Messrs. W. Brown, H. E. Bywater (Hon. Secretary), W. H. Chase, C. Formston, Lt.-Colonel H. Greenfield, Mr. J. W. H. Holmes, Miss D. Howell, Messrs. P. L. MacKenzie, G. Langford, J. W. McIntosh, Dr. R. F. Montgomerie, Messrs. C. W. Ottaway, G. H. K. Peace, W. Perryman, J. Pickup, Capt. R. J. Stow, Miss O. Uvarov, Mr. S. B. Vine, Mr. A. N. Worden, Capt. T. L. Wright, Professor G. H. Wooldridge and Dr. W. R. Wooldridge. Mr. J. A. Branckner, Mr. J. W. G. Leiper and Dr. J. N. Oldham were present as visitors.

The minutes of the January meeting, having been published in the *Veterinary Record*, were confirmed and signed; consideration of those of the February meeting was deferred, pending publication.

*Correspondence.* — (1) From the following Fellows, apologising for their inability to attend: Messrs. J. K. Bateman, W. P. Blount, P. J. Cautley, Captain J. C. Coleman, Sir F. Hobday, Major H. Kirk, Mr. A. B. McIntyre, Professor J. McCunn, Sir John Moore, Brigadier C. A. Murray, Captain L. E. Pritchard, Messrs. E. Brayley Reynolds, Alex Thomson, and Captain J. F. D. Tutt (through illness).

The Hon. Secretary informed the meeting that, in their letters, both Captain Tutt and Sir Frederick Hobday returned thanks for the respective communications he was directed to send—in the case of Captain Tutt sympathising with him in his illness and wishing him a speedy recovery, and in that of Sir Frederick, congratulating him on his speedy and complete restoration to health.

(2) From the family of the late Mr. Henry Gray, thanking the Society for the sympathy expressed and for the wreath sent to the funeral.

(3) From the Secretary of the N.V.M.A., *re* the election of representatives to Council. In this connection the Hon. Secretary informed the meeting that members who were elected would not sit on the Council of the N.V.M.A. until after the Annual General Meeting. Under those circumstances, he suggested that the election of these representatives be deferred till next month, during which interval the Fellows would have the opportunity of thinking over the elections. The Society had seven representatives on the Council, as follows: Mr. L. S. Balls, Professor T. Dalling, Dr. T. Hare, Sir Frederick Hobday, Major H. Kirk, Dr. J. McCunn and Professor W. C. Miller.

The Hon. Secretary's suggestion was adopted, the President stating that the matter would appear on the Agenda of the April meeting.

### The Late Mr. Henry Gray

*Obituary.*—The PRESIDENT observed that they had unfortunately lost recently a prominent member of the profession and a member of that Society in Mr. Henry Gray. Nothing he could say would add to the fine and moving tribute paid to a man of outstanding abilities and personality in the memorial notice by Dr. Tom Hare which had appeared in the *Record*. He thought that Dr. Hare had expressed the feelings of them all, while he had most impressively detailed the veterinary life work of Mr. Henry Gray.

The meeting stood in silent tribute to his memory.

### The Victoria Veterinary Benevolent Fund

Proceeding, the President observed that Mr. McIntosh would like to say a few words at that point, regarding the Victoria Veterinary Benevolent Fund.

Mr. J. W. MCINTOSH said that the President had kindly given him the opportunity to urge, once again, the claims of the Victoria Veterinary Benevolent Fund upon their sympathy and generous support.

As many of them knew, this Fund was doing all it possibly could to give assistance to many of their members and their dependants who had unfortunately fallen upon evil times, either through illness or from other misfortune. At the last meeting of the Council of the Fund they felt that they could not extend to many deserving cases the former measure of assistance that they were giving; that they would have

to cut down some of the allowances and that some would have to be stopped altogether.

Under these circumstances it was decided to make a special appeal to the profession. He had made many former appeals to that Society, but he made no apologies for urging the matter once again. It was, to his mind, a very surprising and regrettable thing that out of more than 3,000 members of the profession only 500 contributed to the Fund. The minimum subscription was only 10s. 6d. per annum, and if every member of the profession were to subscribe even that small sum, they would have no idea how it would contribute to the amount of happiness and the degree of well-being which the Fund could dispense each year through its charitable disbursements.

The sum given out to the beneficiaries amounted to £1,600 a year. Their income from subscriptions last year was less than £500. If it were not for the excellent help they were afforded by the Ladies' Guild, who had added some £300 or £400 a year to the Fund for some time now, they would have had to reduce their charitable activities still further.

He urged every member to give that appeal sympathetic consideration and send half a guinea or more to Dr. Bullock, Hon. Secretary to the Fund. By so doing they would help the Council in their work and they would be doing a great service to people who had fallen on hard and difficult times.

Mr. McIntosh proceeded to relate a number of cases of great hardship requiring relief, indicating the circumstances of the applicants and the measures it had been found possible to take to assist them. He would ask Professor Wooldridge, who is also a member of the Council of the Fund, and who therefore has great experience of the work, to say a few words in support of the appeal. Mr. McIntosh concluded by saying that it had been decided at the last meeting of the Council to send out a further appeal to the profession and to seek, through the Divisions of the "National," to enlist the aid of every member in the furtherance of that beneficent object. He would ask all of them to support the Fund liberally and well.

Professor G. H. Wooldridge said that he would like to support the appeal on behalf of the Victoria Veterinary Benevolent Fund which had been made by Mr. McIntosh. He had given them an impressive amount of detail about the Fund, its work and the service it rendered to those in need, and he did not think it was necessary for him to emphasise that. He would, however, like to commend it to *all* sections of the profession. Most of the older people could well afford to pay 10s. 6d. or more a year to the Fund, but it was possible that the younger members of the profession might find it difficult. He would ask these to bear in mind the fact that they never knew when it would be their turn. There were numerous instances on the books of the Fund where a young veterinary surgeon, after a few years, had a long illness. The little money he had been able to save had been absorbed in doctors' fees, and if, unfortunately, he died and left young children, his wife and family were wholly dependent on charity.

He felt that an appeal should be made to all the members of the profession individually, as well as an appeal to the Association and the Divisions, for support of the Fund. As Mr. McIntosh had said, had it not been for the Ladies' Guild, which was instituted a few years ago, the Fund by now would have been bankrupt, and certainly would not have been able to give even the meagre assistance it had done and continued to render to the best of its ability.

He would ask all who could do so to join the Fund and to pay their minimum annual subscription, if not more. That minimum was 10s. 6d., but he was pleased to say that there were members who had filled in a banker's order for one guinea or two guineas a year. He would urge everyone to support the Fund.

*Elections and Nominations.*—The election to Fellowship was unanimously made of Mr. J. K. Bateman, of The Hook, Northaw, Potters Bar, and of Mr. P. Z. MacKenzie, of the Royal Veterinary College and Hospital, Camden Town. The following were nominated: Mr. J. A. Dall, 86, High Street, Staines (proposed by Mr. R. A. Willett; seconded by the Hon. Secretary), and Mr. J. W. G. Leiper, of Leasey Bridge Farm, Wheathampstead, Herts (proposed by Mr. J. W. H. Holmes, seconded by Dr. Wooldridge).

*Paper.*—There being no morbid specimens or case records, the President now asked Mr. Taylor to give his address, "The Rôle of Pastures in the Development of Strongyloid Diseases in Grazing Animals." This was heard with great appreciation and its discussion occupied the remainder of the evening. [Mr. Taylor's address, the report of the discussion and of the reply thereto, are published at the commencement of this issue.—*Editor.*]

In the absence of any other business, the President, before declaring the meeting closed, said that on behalf of the Fellows, he would like to thank Mr. Taylor very much indeed for the extraordinarily interesting evening with which he had provided the Society: not only for his very lucid and informative address, but for the comprehensive manner in which he had responded to the discussion.

A vote of thanks was passed to the President, also, for his conduct of the proceedings.

H. E. Bywater, *Hon. Secretary.*

## In Parliament

The following questions and answers were recorded in the House of Commons recently.

### Undesignated Milk (Bacteria Content)

Mr. David Adams asked the Minister of Health whether he is aware that undesignated milk supplied by the Milk Marketing Board for human consumption is substantially inferior in the matter of bacteria content to designated milk; and what steps are proposed to deal with this?

Mr. Bernays: I am aware that a bacterial standard is laid down for designated but not for undesignated milk. The upgrading of milk has made very substantial progress in recent years, and it is proposed to continue to assist this in every way possible. The recent improved bonuses for graded milk are, I understand, increasing its supply.

Mr. Adams: If I put down another question can the hon. Member give me the evidence?

Mr. Bernays: I can give the evidence without the hon. Member putting another question down. The amount of graded milk produced has gone up by some 30 per cent. in the last three years.

Mr. Adams: Is the Parliamentary Secretary aware that it is not a question of the amount of consumption but what the bacteria content is?

. . . . .

### Tuberculous Cattle (Wales)

Mr. Pearson asked the Minister of Agriculture whether he will state the number of cattle slaughtered under the Tuberculosis Order, in each of the Welsh counties for the year ending March 31st, 1939; and the amount of compensation paid to the owners?

Sir R. Dorman-Smith: The number of cattle slaughtered under the provisions of the Tuberculosis Order of 1938 in each county in Wales (including Monmouth), during the year ended March 31st, 1939, and the amount of compensation paid to the owners in respect thereof, were as follows:—

| County | Number of cattle slaughtered | *Compensation paid to owners |
|---|---|---|
| | | £ |
| Anglesey ... ... | 69 | 242 |
| Brecon ... ... | 9 | 57 |
| Caernarvon ... | 68 | 345 |
| Cardigan ... ... | 65 | 223 |
| Carmarthen ... | 51 | 271 |
| Denbigh ... ... | 171 | 727 |
| Flint ... ... | 165 | 665 |
| Glamorgan ... ... | 312 | 1,699 |
| Merioneth ... ... | 24 | 103 |
| Monmouth ... ... | 154 | 810 |
| Montgomery ... | 65 | 391 |
| Pembroke ... ... | 60 | 241 |
| Radnor ... ... | 2 | 5 |
| Total ... ... | 1,215 | 5,779 |

*Including compensation due but not yet paid.

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The conclusion is arrived at in a report of an investigation into the cost of horse labour, that the cost of keeping a working horse amounts to £34 a year, and three items—food, labour and depreciation—account for all but £3 of this sum.

# Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

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## Diary of Events

April 24th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

April 25th.—Meeting of the Ladies' Guild (V.V.B.F.) at 10, Red Lion Square, W.C.1, 3 p.m.

April 25th.—N.V.M.A. National Emergency Committee, 36, Gordon Square, W.C.1, 2 p.m.

April 25th.—N.V.M.A. Finance and General Purposes Committee, 36, Gordon Square, W.C.1, 3 p.m.

April 26th.—N.V.M.A. Special Consultative Committee, 36, Gordon Square, W.C.1, 11 a.m.

April 28th.—Meeting of the Midland Counties Division, N.V.M.A., at Birmingham.

April 28th.—Meeting of the Royal Counties Division, N.V.M.A., at Aylesbury, 4 p.m.

**May 4th.—R.C.V.S. Council Election. Last day for nominations.**

**May 8th.—Animal Management Examination begins.**

**May 15th.—Rome Congress on Comparative Pathology begins.**

**May 18th.—R.C.V.S. Council Election Voting Papers issued.**

**May 25th.—R.C.V.S. Council Election Voting Papers due.**

**June 1st.—Annual General Meeting, R.C.V.S.**

**June 8th.—D.V.S.M. Examination begins.**

**June 20th.—R.C.V.S. Committee Meetings.**

**June 21st.—R.C.V.S. Committee Meetings.**

**June 21st.—R.C.V.S. Annual Dinner.**

June 22nd.—R.C.V.S. Committee Meetings.

June 23rd.—R.C.V.S. Committee and **Council** Meetings.

**July 23rd—28th.—N.V.M.A. Congress at Great Yarmouth and Gorleston-on-Sea.**

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### PERSONAL

*Birth.*—Peele.—On April 17th, at Blaidwood, Durham, to Monica, wife of John D. Peele, M.R.C.V.S., a son.

## R.C.V.S. OBITUARY

Elphicke, Cyril, 1, Rothsay Place, Bedford. Graduated December 22nd, 1924. Died April 11th, 1939.

. . . . .

We regret to announce the death of Mr. Cyril Elphicke, which occurred at Hickling, Norfolk, on Tuesday of last week. Mr. Elphicke had a heart attack whilst riding a horse a little over a year ago. His condition was then serious, but he recovered, though not to regain all his former vigour. Lately he had not been well.

Mr. Elphicke, who was in the forties, was educated at Tonbridge, and later at the Royal Veterinary College, Camden Town. He had a distinguished war record, joining up at the age of 18. After the war he started a practice at Sevenoaks, Kent, and about 1924 went to Bedford, where he took over the practice of Mr. E. V. Allen.

Mr. Elphicke worked up an extensive town and country practice. He was Veterinary Surgeon for the County and Borough, Hon. Veterinary Surgeon of the Bedfordshire Agricultural Show and Veterinary Inspector at the Bedford Market. About three years ago he acquired the practice of the late Mr. Crofts and increased his connections to such an extent that he had larger premises built at 1, Rothsay Place. His work did not, however, occupy all his time. He was an active member of the De Parys Club, the De Parys Lodge of Freemasons, and until recently the Rotary Club of Bedford. He also took a keen interest in the now defunct Bedford Operatic Society, and was hon. treasurer for several years.

Deep sympathy will be felt for his wife—Mrs. Joan Elphicke—and his family.

The funeral took place at Hickling on April 13th.

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## MEETING OF THE BRITISH ASSOCIATION

"Milk in its Nutritional and Allied Aspects" was the subject discussed when the British Association (Division for Social and International Relations of Science) met for the first time at Reading University on March 28th. Under the chairmanship of Sir Richard Gregory, five papers were read. These, written expressly for a mixed audience, contained much valuable information of a general nature. The papers were as follows:—

1.—*The Nutritive Value of Milk and its Importance in Diet*—Dr. Harriette Chick. The composition of milk was explained and discussed. Dr. Chick laid particular emphasis on the value of milk as a source of minerals and said that a litre a day was considered a necessary minimum for young children and pregnant and nursing mothers. She made a plea for the greater utilisation of skimmed milk.

2.—*Health Aspects of Milk Supply*—Professor J. C. Drummond. A case was made for pasteurisation, its effects upon the various constituents of milk being fully discussed.

3.—*Implications of Compulsory Pasteurisation*—Dr. A. W. Scott. The problem was dealt with from the points of view of the producer, retailer and the combines. The defects of the system, such as poor supervision, faulty plants and careless workmen, were referred to. Dr. Scott does not agree that the initiative to eradicate tuberculosis will be removed by the introduction of compulsory pasteurisation.

4.—*Distribution and Cost: Economic and Social Implications*—Mr. John Cripps.

5.—*Milk Production*—Mr. James Mackintosh. Reference was made to difficulties in maintaining a uniform supply of milk throughout the year. Overhead costs fall in summer and rise in winter. Suggestions were put forward making for greater efficiency in production.

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## SHEEP SCAB POSITION

"Sheep scab, the bane of the flock-master, is again rampant," says the *Scottish Farmer*. "In England, nearly 130 outbreaks were reported during the first ten weeks of this year. Westmorland and the West Riding of Yorkshire appear to be particularly black spots. Standstill orders, transport restrictions, and dipping regulations passed in consequence of these outbreaks have occasioned much mental worry, physical labour and financial loss to all sheep farmers in the affected areas. Those whose sheep are clean have to suffer as well as those who have scab in their flocks. Twelve farmers convicted at Sedbergh for failure to notify the presence of scab on their stock were mulcted (in penalties and costs) a total of £115. One farmer, alleged to have had 99 sheep obviously infected, was penalised to the extent of £51 12s. 6d., while others had to pay sums ranging from £1 to £17. Scotland during the same period had only two outbreaks, both in the Inverness-shire portion of the Outer Hebrides. It will be a distinct feather in the cap of our veterinary authorities when Scotland attains a clean bill of health. To attain this goal every flock-master must do his bit—and his best—even though for an unfortunate few, immediate interests appear to be sacrificed. Concealment of sheep scab is an anti-social act of the worst order, and merits codign punishment."

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## A REMARKABLE SURVIVAL

Mr. Herbert Kieran, M.R.C.V.S., of the Sudan Veterinary Service, forwards the exceptionally interesting paragraph reproduced below, with the following comment: "The enclosed print is a snapshot of a camel which survived during early life both fracture and dislocation of the cervical vertebrae, the extent of which abnormalities are clearly shown in the picture. The camel is quite healthy, working normally and eating without apparent inconvenience—though grazing is rather awkward for him—and seeks his food mainly from trees."

## ROYAL SOCIETY ELECTIONS

The 20 new Fellows of the Royal Society elected on March 16th include C. H. Andrewes, M.D., F.R.C.P., pathologist, National Institute for Medical Research; F. A. E. Crew, D.Sc., M.D., professor of animal genetics in the University of Edinburgh; F. W. Edwards, Sc.D., deputy-keeper of entomology, British Museum; Sir R. G. Stapledon, professor of agricultural botany and director of the Welsh Plant Breeding Station, Aberystwyth; H. M. Turnbull. D.M., F.R.C.P., professor of morbid anatomy in the University of London and director of the Bernhard Baron Institute of Pathology at the London Hospital; and V. B. Wigglesworth, M.D., lecturer and research fellow in medical entomology at the London School of Hygiene and Tropical Medicine.

Our readers will note with regret that no member of the veterinary profession has been elected to this honour—a truly remarkable omission in view of the magnificent work which stands to the credit of veterinarians within the Empire during the last half-century.

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## RESISTANCE TO EXPERIMENTAL CANCER

This formed the subject of the W. E. Dixon Memorial Lecture delivered by Sir Frederick Banting, F.R.S., in the Barnes Hall of the Royal Society of Medicine, on October 11th, 1938. He dealt mainly with the work done in his laboratory since 1926 on tumours in fowls.

During the past 10 years he had used 10,000 birds for experimental work on the Rous sarcoma: 118 birds, or one in 50, had shown some degree of resistance. Some of the fowls failed to develop tumours after as many as 40 transplants and were kept in the laboratory for as long as five years. Even the injection of a very large dose of tumour cells into the breast muscles of a resistant bird did not produce a progressively growing tumour, but one which regressed two weeks later.

Early in the course of these studies it was found that the plasma of Rous-resistant fowls neutralised cell-free active filtrates of a Rous tumour and hyperimmune sera could be produced by the repeated inoculation with tumour extracts of resistant birds. Since large amounts of immune serum had no effect on the growth of a tumour it appeared that the virus, being within the cancer cell, was unaffected by the blood antibodies. If a large dose—30 c.c.—of immune plasma were mixed with 1 c.c. of tumour extract and injected into a fowl, protection was, however, afforded. All tissues of a resistant bird appear to be resistant both to cell-free filtrates and to tumour cells.

Since 1933 Fuginami strains of filterable fowl tumours had been studied and 22 out of 180 birds had shown some degree of resistance. Of the latter, twelve were inoculated with Rous extract or cells, and ten developed tumours and died, whilst the remaining two became resistant to both Rous and Fuginami tumours. It was found that the plasma of a Fuginami-resistant bird could neutralise Fuginami cell-free extract but was without effect on Rous extract.

Birds which were resistant to the development of Rous tumours were not necessarily resistant to tumours produced by injections of the carcinogenic substance dibenzanthracene.

A variety of methods had been used in attempts to produce resistance to Rous tumours in fowls but without success. "Resistance" indicated refractiveness to grafted cells; "immunity," the condition under which the animal was able to combat, perhaps destroy, the intracellular growth. Resistance was probably a laboratory phenomenon unrelated to the problem of spontaneous cancer, possibly merely an indication of a reaction between host and tumour cells. There was the possibility that the forces which effectively rid an animal of a spontaneous tumour might be a combination of intracellular and anti-viral-immune bodies. The opinion derived from the work he had described was that antigenic differences between host and malignant tissues might be sufficiently great to stimulate antibodies adequate to ensure the disappearance of even spontaneous tumours. It was along these lines that the greatest hope of cancer therapy lay.

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## MORE DUAL-PURPOSE BULLS

Speaking at the annual meeting of the Red Poll Society, Lord Cranworth said there had been a change in views at the Ministry of Agriculture as to the necessity for a greater use of dual-purpose bulls in cross-breeding. No little concern existed as to the growing shortage in the last few years of good store cattle, owing to the extended use of dairy bulls in both pure and "flying" herds.

The flourishing overseas trade for Red Polls, particularly with South Africa and Australia, was the direct consequence of the recognition of the value of dual-purpose cattle. Some 109 Red Polls with an average age of 10 years had won Ministry of Agriculture Merit Certificates. He questioned whether any other breed could show figures equal to those from the standpoint of longevity.

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## SAFE MILK

"The issue in July, 1937, of a white-paper setting out the Government's policy for milk raised hopes that something substantial was to be done towards safeguarding the milk-supply, even if the steps forward were partial and halting.[1] This hope was based partly on the official recognition that an essential step towards an increased consumption of milk was 'to establish public confidence in the cleanliness and purity of the milk-supply,' but mainly on the Government's undertaking to introduce legislation enabling any local authority to apply to the Minister of Health for an order requiring the efficient pasteurisation of milk sold by retail in the area, subject to certain exceptions. This undertaking was implemented in part VII of the Milk Industry Bill. A scrutiny of the provisions, however, showed that the permissive powers were qualified by so many conditions and exceptions as to impair their working efficiency. While it is evident that in the interval between the issue of the Government's policy and the issue of the bill the various trade interests were able to present their points of view, no equivalent consideration was given to the interests of the consumer whose health is the special concern of the medical profession. Actually no medical body was asked for its views on the effect of these provisions.

"The Milk Industry Bill had a bad reception in Parliament and was withdrawn for reconsideration. Various items in this long and complicated

[1] See *Lancet*, 1937, 2, 327.

measure were unpopular, amongst these unfortunately the pasteurisation proposals. No official information is available as to the form the new bill will take, but agricultural interests freely surmise that the pasteurisation clauses will be dropped. Since its withdrawal two important deputations have waited on the Ministers of Health and Agriculture. The deputation on February 8th represented the British Medical Association, the Royal Colleges, the Society of Medical Officers of Health and the Joint Tuberculosis Council. That on February 24th was under the auspices of the People's League of Health which has done much to focus public attention on the milk problem. Both deputations made it clear that the medical profession has made a scientific study of milk and is agreed as to the need of pasteurisation to protect the milk-supply. It has yet to be seen what effect these representations will have upon the text of the new bill. Mr. Elliot has indicated his intention to publish a review of the existing evidence on the whole subject of pasteurisation and the safety of milk-supplies; but will this be in time? If the pasteurisation clauses are jettisoned, even in their present limited and inefficient form, it will be evident that expert and medical opinion is to count for nothing against the dislike of a small section of the milk trade to amend its ways. There must surely be some means of protecting the reasonable interests of the producer-retailer without perpetuating the existing scandal of an unsafe milk-supply. The medical profession through its authorised representatives has stated its conviction that the milk-supply as it now exists is the cause of much disease and suffering which could be avoided by pasteurisation. It fully recognises the need for an increased consumption of liquid milk, but this will remain restricted until (as 'Milk Policy' puts it) public confidence is established in the cleanliness and purity of the milk-supply."—*The Lancet*, March 11th, 1939.

# Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

*The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.*

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## CO-OPERATION WITH THE PEOPLE'S DISPENSARY FOR SICK ANIMALS OF THE POOR

To the Editor of the Veterinary Record

Sir,—I much regret to see so much opposition in these columns to the scheme drawn up between the Royal College of Veterinary Surgeons and the People's Dispensary for Sick Animals of the Poor.

Surely this is a glorious opportunity for the veterinary profession to step in and show the public what skilled attention can do to animals as compared with unqualified treatment.

Up to date the P.D.S.A. has studiously ignored the profession. Now we are to be asked to try our skill on some cases sent to us by this institution. So far, chiefly owing to publicity, the public has thought the P.D.S.A. clinic has been the only place where skilled attention could be obtained. Now, some of the owners with their pets are to be sent by the P.D.S.A. to members of the profession for really skilled treatment. What a chance this is going to be for the profession to educate the public in animal matters! In fact, I can visualise the time when the public itself will demand that all animal clinics shall be staffed or supervised by veterinary surgeons.

Yours faithfully,
C. R. A. Powell.

1, Brook Street,
New Bedford Road,
Luton.
*April 17th*, 1939.

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## MEAT INSPECTION AND POULTRY

To the Editor of the Veterinary Record

Sir,—The article published in last week's *Veterinary Record* dealing with the above subject opens up a very important matter and, without wishing to appear hypercritical, the writer considers some of the statements unsatisfactory.

Messrs. White and Ellis carry out an investigation as to the causes of condemnation by certain meat inspectors of a number of fowls known as "old hens"—average age probably between one and two years—the culls of the poultry industry. The subject was obviously of the greatest importance, yet "it is necessary to stress the rather superficial method of examination adopted." Why? What a wealth of material for the R.V.C. students to have studied carefully under supervision! The "intestines were not opened in every case," which surely means that in cases where the cause of illness was not obvious the diagnosis was not necessarily correct; also, I assume the bone marrow was examined only in those cases representing tuberculosis. Perhaps this is one of the reasons for grouping together cases of myeloid and lymphatic leukaemia, lymphomatosis and fowl paralysis?

Although the bodily condition of the tuberculous birds was given there are no indications as to the remainder. Is one to conclude that birds in fair or good condition were condemned because of "fatty liver," or were these perhaps suspected, in the first instance, as suffering from tuberculosis because the writers state "the yellowish foci (of fatty liver) may be confused with tuberculous lesions"? Mr. Grace also considers there may be confusion between tuberculous nodules and "the liver lesions which may in reality be focal cellular infiltrations due to leukaemia." These observations rather suggest that the original inspections were somewhat tainted by a tuberculophobia.

Of equal interest was the finding by Messrs. White and Ellis of seven cases of cysts of the rudimentary right oviduct. After conducting poultry *post-mortem* examinations for a number of years I have never once seen a pathological involvement of the right oviduct, and to have found seven cases in 250 birds is somewhat astounding. I therefore make the suggestion that the cysts were really of the bursa of Fabricus which is relatively common in hens—can the writers recall if this structure was present normally in addition to the right oviduct?

These "old hens" are described by Mr. Grace as being twelve to 15 months old. In view of the fact that the poultry industry nowadays

accepts a hen as a bird which completed one full laying year, *i.e.*, its age is about 18 months, would it not be best to retain the same terminology in meat inspection?

Finally, although all veterinarians are agreed that "a national system of inspection for poultry" is a necessity, is it really true to suggest that the principle involved is "whether the article examined is sound and free from disease" so that, as advocated by Mr. Grace there should be "nothing short of thorough inspection and confiscation of diseased and unsound carcases." Surely we are not going to condemn birds just because of a fatty liver, or an oviduct cyst 2 cm. in diameter? What of splenomegaly, irido-cyclitis, catarrhal proventriculitis, chronic (post) coccidiosis characterised by an isolated caseous nodule of the caecal tube, and a dozen other pathological conditions one could enumerate? Is a turkey carcase in good condition and weighing 15 lb. or more to be condemned because of a few blackhead lesions? Further, why seize a bird exhibiting as its only pathological feature a bacillary white diarrhoea ovary when during life it has been laying infected eggs which have been eaten as happily as all ordinary eggs? Is the bird's body weight not to be considered in association with the disease findings?

I believe the subject well worthy of a discussion at our annual N.V.M.A. Congress at Yarmouth and hope the authorities will find this a suitable suggestion to add to the existing agenda.

Yours faithfully,
W. P. Blount.

The Pantiles,
Corsica Road,
Seaford,
Sussex.

*April 17th*, 1939.

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## TREATMENT OF STERILITY

### To the Editor of the Veterinary Record

Sir,—Whilst I agree with Professor Browne that the system of controls is the most admirable and perhaps the only way in which to arrive at a satisfactory conclusion on the value of a product, I submit that it is extremely unlikely in the course of actual practice, bearing strictly in mind the nature of the sterility on which wheat germ oil should be tried, that "big numbers" will be encountered to permit of a system of controls.

As regards the comments and queries of Mr. G. N. Gould—knowing him very well, I can comment with the assurance that I shall get a reply!

I dislike lactic acid. I rather think that he once advised it in 2 per cent. strength. In this strength, it proved a remedy *par excellence* for literally "pickling" the uterus. In 1 per cent. strength it proved a regular "wash-out" in actual name and effect in a herd of 150 Ayrshires, 80 of which, together with two bulls, were infected with *Trichomonas*. The owner was already dissatisfied with the varying results of tuberculin testing with a view to attestation, and this, in conjunction, finally made him go in for an accredited herd of Shorthorns, with the result that he now has a profit on his dairy herd!

Provetan as a rule does not induce oestrus under two weeks. In some cases the period is three, after injection. I have not yet tried it in cases of *Trichomonas* infection, but only in cases of persisting corpus luteum, or in the absence of oestrus with nothing to account for the condition on rectal examination of the ovaries.

Prolan was mentioned at the meeting when Professor Nicholson read his paper. Its effects in not a few cases have been disappointing. I consider that the dose should be 500 RU in the mare and cow, and in addition the ovaries must be examined, and massaged even if appearing normal.

Whilst on the subject of sterility, have any of my colleagues encountered an eruption on the penis of the stallion, and on the vulva and just inside on the walls of the vagina in mares, which for want of a better name can only be described as "pox"? I have cases every year, in thoroughbreds, and the "incubation period" seems a variable one of from five to seven days. I have seen one case in a Shire stallion which was reputed to have received an injury to its penis, and which infected every mare he covered. In some cases, the eruptions occur, in addition, on the whole of the perinaeum, and remain as permanent "white" blemishes against the normal black pigmentation in this region. I can find no reference to the condition. The infection undoubtedly originates from a "dirty" mare, and is conveyed to others by the stallion in the act of service.

Yours faithfully,
J. F. D. Tutt.

"Rothiemurchus,"
St. Cross,
Winchester.

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## THE BY-PRODUCT INDUSTRY

### To the Editor of the Veterinary Record

Sir,—Parts of the speech of Professor Share Jones at the inaugural meeting of the Welsh Branch of the N.V.M.A. have been given prominence in the agricultural Press (*vide* the *Farmers' Weekly*, March 24th, 1939). As some of the statements are not only misleading but incorrect, I would point out that, instead of "mills and factories dealing with raw materials derived from animals had been allowed to die," actually the reverse is the case. Research in science and engineering has resulted in more animal by-products being processed in recent years than ever before, the capital and labour being British and not foreign, as stated. To say that, "the skins of Welsh sheep—with the wool on—had been sold to foreign buyers for 4d. each ..." is perfectly ludicrous. The last year has been one of very low values in sheepskins, but even the small skins from early killed Scotch Blackfaced lambs were selling at an average of 2s. each. Fine-woolled lambs were higher in price. What Professor Share Jones may have intended to convey was that the skins of *dead* or *newly born lambs*, known as "morts," were selling at 4d. each. Relatively a good price!

It has long been the pride of animal by-product manufacturers and kindred trades in Scotland that they have the most efficient processes and services. Working in close co-operation with the meat trade, they handle, *and pay for*, the skins, or hides, fats, heads, plucks, tripes, gut, feet, glands and blood from abattoirs (the bleat of the sheep still beats them). This efficiency operates over all Scotland with the

exception of small erratic kills in the extreme North. It is agreed that in many parts South of the Border such total efficiency does not exist; but to state, as Professor Share Jones states, that "the worst feature of the case was that the cost of the whole sheep was extracted from the meat alone" is a gross inaccuracy. Skins, fats, gut and plucks have a market price anywhere in England to-day. Allowing that in some parts of England the recovery of all by-products is not fully covered, I defy Professor Share Jones to prove that the value of such raw material lost is £200,000 *per annum*, let alone per week, as he suggests. Had Professor Share Jones brought some publicity to the none-too-widely known benefits of feeding animals on home-produced carbohydrates mixed with home-produced concentrated proteins of animal origin, he might have stimulated the by-product industry to even widening their scope to include some possibly forgotten areas.

Yours faithfully,
ROBERT G. McQUEEN,

W. & J. Dunlop, Ltd.,
Hide, Skin and Tallow Brokers,
Animal By-Products Manufacturers,
Dumfries.

*April 7th*, 1939.

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## THE GUIDE DOGS FOR THE BLIND ASSOCIATION

TO THE EDITOR OF THE VETERINARY RECORD

Sir,—So many veterinary surgeons have come up and spoken to me after my various lectures throughout the country on the guide dogs for the blind and invariably they suggest I should write to you, which I now do, hoping that you and your readers may be able to help the great cause.

I get letters by nearly every mail from blind people asking for a guide dog and it is indeed disheartening to say "No" through lack of funds and dogs. We confine our activities mainly to Alsatian bitches and I am hoping that some of your readers may help in this way. I imagine that quite a number of people occasionally want to get rid of their dogs for various reasons and I am always anxious and willing to take an Alsatian bitch of about a year old and send her up to Wallasey, the school, to be trained; but I will also take puppies of from six to eight weeks and get kind friends and supporters of the movement to look after them until they are old enough to go to the school.

I shall be very pleased to meet any of your readers and answer any questions they may like to ask.

Thanking you in anticipation,
Yours truly,
P. L. M. BATTYE.

58, Mark Lane,
London, E.C.3.

*April 9th*, 1939.

[Colonel Battye's appeal is one which we would commend strongly to the sympathetic attention of members of the profession. In this connection, we would remind them of the interesting account published in our issue of August 8th, 1936 (*V.R.* **48**. 32. 985-986) by Miss Mary T. Melling, owner of one of the guide dogs, describing the activities of the Wallasey school for training dogs for the blind.—*Editor.*]

## DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT OF 1937 (PART IV)

### SUMMARY OF RETURNS

| Period. | Anthrax. | | Foot-and-Mouth Disease. | | Parasitic§ Mange. | | Sheep Scab. | Swine Fever. | |
|---|---|---|---|---|---|---|---|---|---|
| | Outbreaks confirmed. | Animals attacked. | Outbreaks confirmed. | Animals slaughtered as diseased or exposed to infection. | Outbreaks reported by the Local Authorities. | Animals attacked. | Outbreaks confirmed. | Outbreaks confirmed. | Swine slaughtered. |
| | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Period 16th to 31st Mar., 1939 | 54 | 60 | — | — | 2 | 3 | 10 | 61 | 18 |
| Corresponding period in | | | | | | | | | |
| 1938 ... ... ... | 44 | 48 | 10 | 499 | 5 | 7 | 7 | 14 | 19 |
| 1937 ... ... ... | 23 | 28 | — | — | 4 | 5 | 6 | 61 | 24 |
| 1936 ... ... ... | 31 | 34 | — | — | 3 | 8 | 7 | 118 | 127 |
| Total 1st January to 31st Mar., 1939 ... ... ... | 262 | 280 | 29 | 4,262 | 19 | 36 | 139 | 338 | 182 |
| Corresponding period in | | | | | | | | | |
| 1938 ... ... ... | 259 | 270 | 113 | 15,158 | 32 | 49 | 82 | 96 | 52 |
| 1937 ... ... ... | 178 | 205 | 3 | 262 | 57 | 88 | 96 | 311 | 179 |
| 1936 ... ... ... | 153 | 187 | 4 | 379 | 49 | 167 | 120 | 552 | 404 |

NOTE.—The figures for the current year are approximate only. § Excluding outbreaks in Army Horses.

### Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.* herds officially certified as free from tuberculosis as at 31st March, 1939, was as follows:— ENGLAND 1,506 ... WALES 3,127 ... SCOTLAND 1,336 ... TOTAL (GREAT BRITAIN) 5969,